# Nature Magazine

VOLUME 44 NUMBER 1

JANUARY, 1951

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# Nature in Print

*By* HOWARD ZAHNISER

IF THE American people wish to make some good New Year's resolutions regarding the conservation of their natural resources they might well start in now by reading Bernard Frank's and Anthony Netboy's newly published book entitled *Water, Land, and People.* In a compact volume of firm, clear, statements, without hysteria but with deep earnestness, these authors authoritatively and convincingly demonstrate the need for a solution of our water problems that would be in effect a correction of our policies and practices in all land use. It is a demonstration of the truth that, to conserve adequately any particular resource, we must establish a total program of conservation. If we handle one resource in full wisdom we conserve other resources too, but if we fail to be conservationists in our attitude toward all our environment we can not hope for full and true success with any part of it. Thus it is that *Water, Land, and People* can serve a reader — a general reader — as a volume on our whole conservation needs. Although its authors start out with a concern for water they find themselves involved with all other resources, too, and ultimately with the cultural pattern of the people. Watersheds are to them the "end-products" of all the elements that compose our physical environment. Their work is a profound demonstration of the interdependence of all the many aspects of conservation. It is a sobering demonstration of the complexity of our so-called water problems, and the need to face them thoughtfully and with prime regard for the public interest.

Our water problems are indeed severe, as this book makes clear, and they are "destined to increase greatly," say its authors, "if the damaged farm, forest, and grazing lands in the hill and mountain areas are not fully rehabilitated." Again they observe that "if the present land-use trends continue, the ability of the nation's hill and mountain areas to furnish well-regulated supplies of usable water to consumers in the valleys will steadily decline."

"In the final analysis," Mr. Frank and Mr. Netboy emphasize, "water problems are land problems." And again they point out that "the same basic principle applies whether the land is to be used for crops, forage, or timber." The key "to nearly all our water problems" they find in a requirement that "the watershed should be protected and used in such a manner as to maintain the stability and health of the soil, and therefore its ability to absorb water."

How diverse are the problems in protecting our watersheds may be illustrated by our authors' discussion of what they call, in a title, "The Highway Craze." Who would realize at first thought that our roads menace our watersheds? Yet Mr. Frank and Mr. Netboy write (in a paragraph that includes also a summary list of land abuses):

"In our frenzied efforts to 'develop' the land, we have not only harmed the watersheds by foolish plowing, overgrazing, forest fires, clear-cutting, and deplorable skidding methods, but also by building woodland and rural highways. We have crossed and crisscrossed the great mountain ranges with roads and trails. One scenic slope after another has been dynamited without regard to soils, plants, or streamflow. In order to satisfy the motorists' itch to reach the high places and take in the awesome views quickly and with little exertion, an extensive forest domain has been sacrificed. Likewise, purling streams are no longer a fishermen's paradise because many sportsmen are unwilling to hike or ride horseback over forest trails, but insist on driving to the water's edge. . . . They have no idea that road building has helped to depopulate the waters, which now can yield only the tame, hatchery-reared fish dumped into them every spring."

Thus our authors introduce a section that concludes their book's Part I — on "The Problems" — with a discussion of the watershed damage done by such "classic examples" of highway projects as the skyline drive in the Smokies and the Angeles Crest highway in California's San Gabriel Mountains.

*Water, Land, and People,* a book of ten chapters in three parts, deals, however, not only with "The Problems," but also with "The Cost" and in great detail with "The Solutions." Many readers will doubtlessly value most highly its critical analysis of the "solutions" so far attempted.

The first of these chapters, dealing with "Engineering Solutions — Wise and Misbegotten," should be required reading for all those who are deciding our further course in dam building. Mr. Frank and Mr. Netboy open up this discussion with an insistence that "improvements on the river can be of greatest service to man only if planned wisely from mountains to the sea," and they conclude it with a declaration that the public interest would "best be served by holding in abeyance many of the dams now proposed until thoroughgoing plans for the restoration of the watersheds above them have been presented to the public."

An important section of this chapter entitled "Natural Beauty Imperiled?" will be welcome reading to many conservationists who are contending against the location of dams in our national park system and in other areas of wilderness that have been set aside for preservation.

"There is not left much of the primeval wilderness," Mr. Frank and Mr. Netboy point out, and what remains is "now found mainly on the upper and least accessible reaches of the major drainage basins." Analyzing the present situation, they write:

"The remaining wilderness is precious to increasing numbers of people, particularly those penned up in cities, because it offers an avenue of escape from a gregarious and mechanized existence. Since much of it is in the high mountains that harbor the headwaters of the great rivers, where dams have been proposed, there is resistance to these projects by those who regard the preservation of primitive tracts as a vital national need. The public outcry is becoming more intense as engineers and politicians, backed by cement and steel manufacturers, building contractors, and other industrialists, bring forth plans for erecting dams in vaulting rocky gorges, flooding primeval forests or marshlands, or destroying mammoth labyrinthine caves. Unquestionably, if most of the projects now under discussion ever get beyond the drawing-board stage, many state and national forests, parks, and wildlife refuges will face encroachment or ruin."

Our authors make a clear-cut protest against a program that ignores the values of the wilderness and its wildlife.

"Unfortunately," they say, "planners of water developments have often ignored man's need for outdoor recreation and com-

## To A Pet Coyote

*By* BLANCHE M. IRVING

The merest sound is thunder to your brain;
So keen is that integrity of breed
From which you sprang, your trust is never freed
Wholeheartedly from doubt of us, or strain
Of that alertness which is almost pain
When stranger voices speak and footsteps lead
Too near your crouching heart; your instincts plead
Against the puny circle of your chain.

Sometimes we see you quiver and grow taut,
Responding to some stray, ancestral sound
That sweeps the earth too faint for us to hear;
And we can know your spirit leaps, uncaught,
To lope across a singing, hog-backed ground
Through sage and prairie brush, unknown, yet dear.

munion, in the Wordsworthian sense, with rocks and stones and trees and the everlasting hills. In short," they protest, "if the United States is to retain outdoor playgrounds adequate to meet the recreational interests of 150 million or more people — the majority of them travel-minded — we cannot afford to ruin more wilderness areas, spectacular geologic formations, or pristine valleys."

In a following chapter entitled "Land-Use Solutions — Too Little and Too Late?" Mr. Frank and Mr. Netboy review our forest and soil conservation programs, our attempts at watershed management and repair, and our moves to coordinate land-use programs. They note "a traditional tendency to use land wastefully and not to face squarely the social consequences" and in the light of this tendency feel that "we must not be too critical of the engineering approach to our watershed problems."

Most hopeful solution so far applied seems to our authors to be that of river-basin development, yet they entitle their chapter on the prime example of this "Mirage of River-Basin Development — TVA" and find many constructive criticisms to make regarding the way in which the TVA program has been handled.

"In its seventeen years of existence TVA," they write, "has scored great successes in harnessing the river, electrifying the valley, and promoting soil conservation and land improvement. But the concept of watershed management, clearly suggested in the enabling legislation, has been and is still beyond its ken." They call on TVA to "become a more aggressive land-restoration and development agency" and they suggest that "to this end, it would need to prepare some kind of comprehensive plan for the integrated restoration of the watersheds." In a second chapter devoted to river basin development, the "Ferment in the Missouri and Columbia Valleys" is discussed in detail in a most helpful review of the situation with reference to the proposals to manage these two valleys for total conservation, and the volume's concluding chapter, declaring in its title that "Now Is The Time," presents a series of recommendations.

A basic need, our authors emphasize, is for "a greatly expanded program of fact-finding." Public apathy and ignorance they view as "main obstacles" and insist that "victory in the battle for conservation will be in sight only when Americans become aware of the imperative need for using their natural resources wisely." Land use, they maintain, must be socially controlled, and critical areas should be in public ownership. The ultimate test, they say in the book's final section heading, is "Can We Alter Our Cultural Patterns?" and in their final two paragraphs they express their hopes for the future as follows:

"The outlook for the future, although it may be dim, does not warrant pessimism. The welfare of the majority is more and more becoming the foundation stone of our judicial system — evidence that the cultural pattern is changing.

"It is logical to believe that, in time, the stake of the people in our land and waters will surmount the individual's right to exploit these natural resources as he sees fit. When that time comes, the welfare of the nation will be much more assured. Our hope is that this beneficent state of affairs will not be long delayed."

Surely the delay has to some extent at least been curtailed by the publication of this book *Water, Land, and People*, and we can well express our appreciation to its authors. With the good intentions that they stimulate we can the better face the new year and hope for the distant future.

*Water, Land, and People. By Bernard Frank and Anthony Netboy. New York: Alfred A. Knopf. 1950. 331 + xi pp., with 37 photographs on 21 plates, 3 maps, list of references, selected bibliography, list of watershed research centers in the United States, and index. $4.*

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### Bartholomew Atlas

*The Advanced Atlas of Modern Geography.* By John Bartholomew. New York. 1950. McGraw-Hill Book Company. $8.50.

For more than a century John Bartholomew and Sons, Ltd. have enjoyed an enviable reputation as cartographers. This reputation is again evident in this fine new atlas, in a new edition for the first time available in the United States. All plates are new and have been remade in accord with the latest available geographical data. The world is covered by regions, rather than limiting most maps to national boundaries or other political subdivisions. Other information included on these maps includes climate, oceanography, ethnography, religion, language, cephalic index, skin color, geomorphology, geology, soils, agricultural regions, vegetation, economic areas, population density and routes of commerce. There is a complete index and a short history of geographical exploration in the Old World and the New World. It is a superlative atlas.

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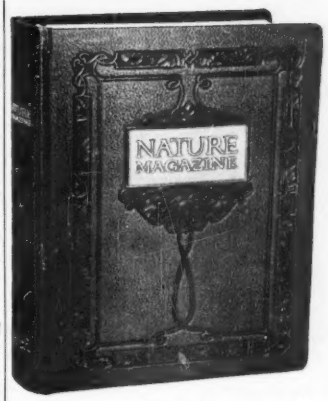
### Hardwood Forests

*Deciduous Forests of Eastern North America.* By E. Lucy Braun. Philadelphia. 1950. The Blakiston Company. 596 pages. Illustrated, with end map. $10.

In this text the author, an outstanding authority, presents the basic facts involved in the ecology, succession and geography of the deciduous forests of eastern America. The book is divided into three parts, covering the composition of virgin forests, analyzing and comparing climax communities, tracing the expansions and contractions of the deciduous forest formation and its segregation into types, and demonstrating the genetic relations of its several parts. Because of its presentation of original forest conditions, the book is extremely useful for soil conservationists and plant and animal ecologists, and is excellent for college courses in ecology, conservation of natural resources, or forestry.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## IN THIS ISSUE


January, 1951 Vol. 44, No. 1



Christmas Rose ..... Margaret Mellor Cover
Nature in Print ..... Howard Zahniser 2
To A Pet Coyote (Poem) .... Blanche M. Irving 2
By Way of Report ..... 6
Contents Noted ..... R.W.W. 7
Legendary Message-Carriers of China ..... Mabel Irene Huggins 9
View of Chocorua (Poem) ..... Daniel Smythe 12
"Living Wonders" ..... Louise Dyer 13
Weather Wisdom (Poem) ..... R. F. Armknecht 15
The Return of the Cormorant ..... N. J. Berrill 16
Emily Sartain — "Wildflower Woman" ..... Gilean Douglas 19
Gem Stones of the Appalachians ..... Ashton Chapman 21
Twelve Years' Old (Poem) ..... Helen Smith 24
Mollusks of Land and of Fresh Waters ..... E. Laurence Palmer 25
Water and National Parks (Editorial) ..... 33
Dinosaur National Monument .. Harvey Broome 34
Ravens and Other Good Neighbors ..... Nell Murbarger 37
Madagascar Periwinkle for Sunny Spots ..... Dorothy K. Sampson 41
Olives ..... Ruth Dudley 42
The Heavens in 1951 ..... Isabel M. Lewis 43
When Men Companion Stars (Poem) ..... John Gallinari Whidding 44
The School Page ..... E. Laurence Palmer 45
Camera Trails ..... Edna Hoffman Evans 46
Grasslands Monuments ..... 48
Under the Microscope .... Julian D. Corrington 54



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### Protozoa and Neighbors

*The Private Life of the Protozoa.* By Winifred Duncan. New York. 1950. The Ronald Press Company. 141 pages. Illustrated by the Author. $3.00.

In this entertaining book the author is concerned with "the vivid and exciting lives of the tiny creatures who had their being, year after year, in a mud puddle which lay permanently in my garden in Mexico." This little pool, indeed, supported a considerable population, and an altogether fascinating one. Besides the protozoa there were metazoa and insect larvae of numerous species and interesting form and habit. From time to time Miss Duncan would scoop up a cupful of the inhabitants of her little pool and transfer them to her glass aquarium, there to observe dramas in miniature, and to study the personalities and activities of her minute friends. *Amoeba proteus* was her favorite and heroine, but Amoeba's associates were equally fascinating.

In this book — one in the excellent "Humanizing Science" series being published by Ronald Press — Miss Duncan tells of the tiny and the microscopic creatures in a vein similar to that which makes her earlier *Webs in the Wind* such thoroughly alluring reading. We imagine that anyone reading this book will wish to make the acquaintance of similar small creatures that inhabit like ponds everywhere. Although certainly not written as a guide to the protozoa and its associates, this book nevertheless turns out to be just about that anyway, but its great charm lies in the way in which the reader is introduced to the creatures discussed.

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### Seashore Life

*Field Book of Seashore Life.* By Roy Waldo Miner. New York. 1950. G. P. Putnam's Sons. 888 pages. Illustrated. $6.00.

This distinguished addition to the series of Putnam Field Books has been twenty years in the making. It is a compact manual of all of the more common invertebrates found in the shallow oceanic waters of the North Atlantic Coast. It covers, lengthwise, the coast from Nova Scotia to Cape Hatteras, and, in width, from the upper tide limits to the edge of Continental Shelf. It is for the layman interested in seashore life, for the student of that life and for the person engaged in research in this field. There are 250 full pages in black and white illustration and 24 color plates.

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### Parks Advisor

Charles G. Woodbury of Washington, D.C., conservationist and horticulturist, has been appointed a member of the Advisory Board on National Parks, Historic Sites, Buildings and Monuments by the Secretary of the Interior. This Board was authorized by Congress to advise the Secretary and the Director of the National Park Service on matters of policy.


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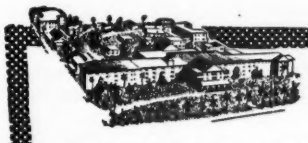

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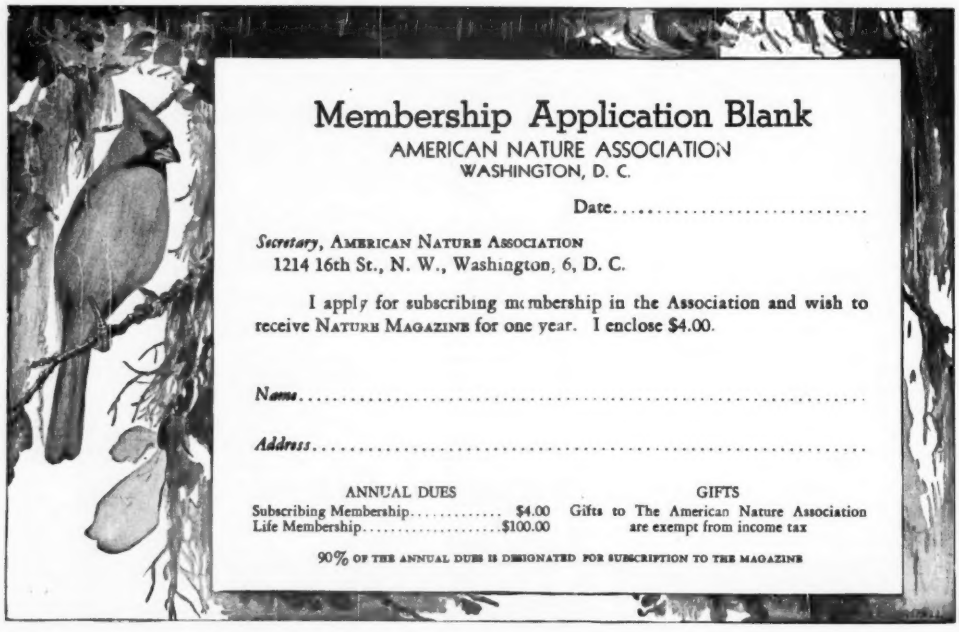
# By Way of Report

AN ORDER from Secretary of the Interior Oscar L. Chapman for investigations in the Rogue River Basin, Oregon, looking toward development of a properly balanced, multi-purpose plan for that area is encouraging. Bureau of Reclamation studies have developed quite complete information on the irrigation and power aspects of development of the Basin. Too often such studies are the end-all of investigation, and Secretary Chapman's direction that the Rogue River region be carefully studied to produce equally complete imformation on its scenic, recreation values, and fish and wildlife is a distinct step forward. It is a definite indication that efforts of conservation organizations, such as ours, to emphasize that there are other values beside those of power and irrigation are at last bearing fruit, and that the exploiters and dam builders will have to recognize such values.

Failure of the bill that would have protected from extinction the Key deer on Big Pine Key, Florida, turned on a technicality raised by Senator Forrest Donnell of Missouri. This may mean the destruction of another American wildlife species. The bill may receive consideration at the brief post-election session of Congress, but it is more likely that it will have to be reintroduced in the new Congress, which may be too late for the deer. The bill had been passed by the House and had received a favorable report from the Senate committee.

Harry E. Radcliffe, vice-president of the American Nature Association, represented the Association at the Annual Meeting of the Natural Resources Council of America — of which he is treasurer — in Knoxville, Tennessee. A preliminary program for a land and water policy for the United States was adopted by the Council, clearing house for thirty-four national conservation organizations.

Richard W. Westwood, president of the American Nature Association, was appointed to the three-member publicity committee of the International Union for the Protection of Nature at its Second General Assembly of the Union held in Brussels, Belgium, in October. Mr. Westwood attended the sessions as one of the United States delegation. This committee is charged with the responsibility of spreading the word of the activities and objectives of the Union in the world conservation picture. The Assembly recognized the fact that the two formative years of this international organization have been largely occupied with preparation of a program and establishing the Union administratively. Now a going concern, I.U.P.N. needs even wider support than it has already received.



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# Contents Noted

In October, on our way to attend the sessions of the International Union for the Protection of Nature in Brussels, we were able to spend eleven days in England. Five of these days were devoted to driving a little car over the countryside of Gloucestershire, Wiltshire and Devonshire, incidentally an interesting experience to one accustomed to the right hand side of the road. From this wandering we brought back a lasting picture of the beauty of rural England, from which the ubiquitous billboard is happily absent. The hedgerows that line so many of the highways were hosts to bird life, small and large. The seashore communities of Devon are lovely, and nowhere did we find the sign-cluttered approaches and buildings, and the honky-tonk that spoils so many of our resorts for anyone with an ounce of good taste and respect for the amenities.

Traveling about England, and later in France and Belgium, we instinctively kept our eyes open for evidences of erosion and abuse of the soil. We saw none. Rather did we see fields patched with areas planted to legumes, and resting from their labors of crop production. Strength was being put back into the soil, as it has been put back for generations. On the continent there was an absence of hedgerows, at least in northern France and Belgium, and thus little hospitality for wildlife, but, at least, the soil was being treated with care and respect.

Any visitor interested in wildlife conservation cannot help be shocked by the attitude toward bird life, large and small, in Belgium. There, only a handful of song birds are nominally protected. Most birds are trapped or netted and sold in the bird markets in Brussels and elsewhere. Finches and other song birds are live-trapped and sold in cages at the Sunday morning market in the Grand Place in the Belgian capital. Larks, dead, brought twenty-five francs (fifty cents) a dozen. Hawks were offered in quantity and variety, and recommended as adding savor to stews. At the time of our visit many species were migrating southward and business in birds was brisk. Many of these birds came from Norway, Sweden, Denmark, and the Netherlands, where bird appreciation and protection is much further advanced. Belgian conservationists are sad at this situation, but progress in enlightening the population is slow and discouraging. Some of the birds that escape with their lives from Belgium face death in Italy, where any bird of whatever size is sought for the soup pot. Italian delegates to the sessions of the Union emphasized the great need of education in Italy, where one of the Union's projects of education is shortly to be put into effect.

Over the weekend delegates to the Brussels sessions went by bus into the southern part of Belgium, the Ardennes and the region of the Battle of the Bulge. There we made a strenuous hike over the Haute Fagnes, or high moor, a great expanse of heather and grassland that Belgian conservationists are trying to have acquired by the government and set aside as a park and wildlife sanctuary. It should support much wildlife, but we saw very little. We flushed one Scottish grouse, and saw a handful of smaller birds.

Delegates also visited other Belgian national parks, in which areas wildlife is protected as much as enforcement policy permits. These areas are not now sufficiently large or numerous enough to be significant in providing sanctuary for wildlife. The addition of the Haute Fagnes would help, and the friends of national parks in Belgium are earnest, active and determined. Brussels is fortunate in having the fine Foret de Soignes on its outskirts, a fine forest and wildlife area. Venison and other game was prominent, however, on all of the menus in the excellent Brussels restaurants, where one can eat royally, if expensively.

When one of the delegates acquired a dozen larks and laid them on the desk of the presiding officer of the Union, in obvious criticism of the Belgian attitude toward bird life, one of the British delegates deplored such criticism. She said that there was much that the British feel is bad in the treatment of wildlife in Britain but that these are problems for the British to work out. We found this viewpoint a little difficult to understand. There is much that we do not like about attitudes here in the United States, and many practices that we deplore. Criticism, however, we would welcome. Perhaps such criticism is not diplomatically sound, but we cannot help but feel that concern for wildlife preservation and area protection knows no diplomatic barriers and is not concerned with protocol. No country can take a superior attitude with respect to its treatment of natural resources, if the record of the past is scrutinized. Nevertheless, frank comment should not hurt anyone's feelings, if it is justified.

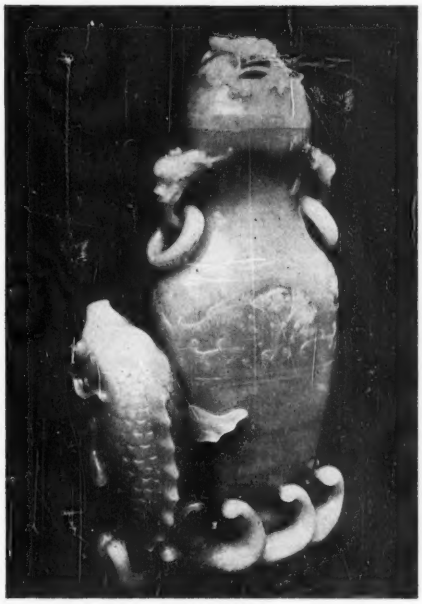
Flying both ways across the Atlantic, just overnight each way, we were inevitably impressed by the manner in which distance is today contracted. Our last previous crossing had been in a small liner that took eleven storm-tossed days for the trip. This time we were whisked smoothly over between dusk and dawn; ordered dinner in French and breakfast in English. That the same machine that can bring one quickly to the fascinations of other lands and other peoples also can fly as a threat to the lives and peaceful pursuits of human beings struck us as supremely tragic. And, after meeting for a week with men and women from thirty-four nations, freely exchanging ideas and information, it seemed equally tragic that the world is menaced by individuals and forces seeking destruction.—R.W.W.

PHOTOGRAPH BY DEVEREUX BUTCHER

**One of the greatest gorges of Dinosaur National Monument's Green River is Whirlpool Canyon. This view, looking west, down-stream, was taken from the top of Harpers Corner, a vertical distance of 2800 feet above the river. At the foot of Harpers Corner is the site for the proposed Echo Park dam. Split Mountain dam, proposed to be built a few miles west of here, would create a reservoir through Whirlpool Canyon. to the base of Echo Park dam.** **(See article on page 34.)**

# Legendary Message-Carriers of China

*By*
MABEL IRENE HUGGINS



**The smaller part of this white jade double vase is a carp leaping from the waves. Surmounting the lid of the larger part is a dragon in relief. 18th century. Courtesy, Walker Art Center. The leaping carp, the Dragon Gate, and the dragon are all represented below on a pair of 19th century embroidered sleeve bands. Courtesy, The Metropolitan Museum of Art.**

IN ROMAN mythology, Venus, with her message-carrying doves, could not lay claim to anything as unique as the Chinese have had in their traditional messengers—the "blue-bird," the wild goose, and the carp. In time of war we have adopted the descendants of the doves of Venus, or their homing-pigeon relatives, and trained them for heroic work, but the legendary message-carriers of China still remain in a realm of pure mythology so far as letter transportation is concerned.

For centuries Chinese poets have written of "blue-birds" as messengers between lovers and friends. In a line from Tu Fu (A.D. 712-770) we read of "blue-birds" that were carrying their messages on vermilion handkerchiefs — and we thus note, in passing, the Chinese love of color. Another poet of about the same period, Meng Hao-jan (A.D. 699-740), tells that "a flashing blue-bird" called him to his friend's home. And Li Shang-yin (A.D. 813-858) uses an imploring tone when he writes:

"O blue-birds, be listening! — Bring me what she says!"

When we come across such allusions in translations of Chinese poetry, we must not allow the American blue-bird to fly through our mental picture because it does not occur in Asia. The Chinese poetic expression *ch'ing niao* has been translated "blue-bird," but that term does not afford sufficient identification for the satisfaction of an inquiring mind. The word *ch'ing* is quite all-inclusive in its application to the colors of Nature, being used for any color from white to black! In bird names, however, it is more limited, referring to any black, green, or blue. *Niao*, the second character of the Chinese expression, offers no difficulty because it is the common designation applied to each and every sort of bird.

So what is this mythical "blue-bird" of which the poets wrote? There are two possible answers, and probably neither is correct. An American ornithologist nominates the azure-winged magpie, *Cyanopica cyana interposita*, as being the most likely candidate to qualify as the "blue-bird" of the poets. It comes around people's houses, and right to their windows if the walls are ivy covered. But there are Chinese who assert that one of the kingfishers is popularly held to be the "blue-bird." Anyone who has ever had the good fortune

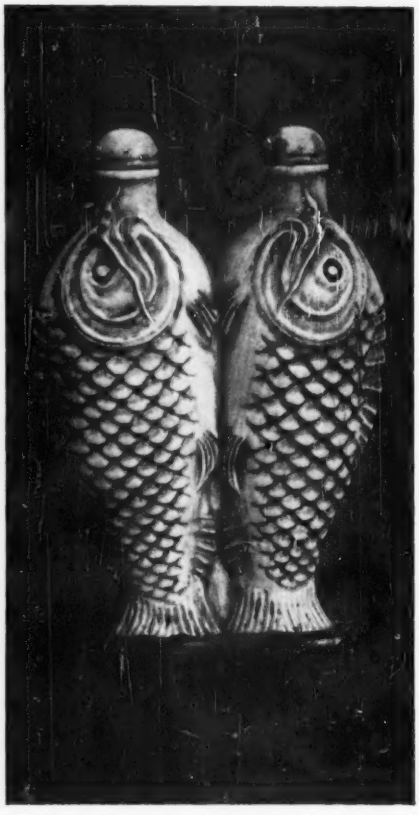
**Stamps of the 1897 issue of the Imperial Chinese Post recognized the carp and the wild goose as message-carriers. Below, the snuff bottle of ivory is in the form of a pair of carp. 17th-19th century. Courtesy, The Minneapolis Institute of Arts.**

to look down upon the common Indian kingfisher, *Alcedo atthis bengalensis*, as it has flown out into the sunshine, can understand the pertinence of the phrase, "flashing blue-bird." However, it is hard to imagine a kingfisher carrying a message of love and affection.

Chinese arts and crafts are usually helpful in portraying specimens of bird and other animal life. We search on porcelains and embroideries, where we find the twelve animals of the zodiac, the "five poisons," the symbolic animals of longevity, and even the "hundred" birds, but we fail to discover amongst them anything that seems to represent a "blue-bird." We turn to Chinese paintings with more success, and find that both kingfishers and azure-winged magpies caught the attention of the painter, but neither with great frequency.

Chinese jewelry is the one artistic field in which the kingfisher has had an important place. As is well known, Chinese jewelers have attained great proficiency in the production of filigree. In doing this type of work they have added to its effectiveness by combining it with motifs overlaid with the iridescent, turquoise-tinted feathers of the kingfisher. Although this variety of jewelry is extremely fragile and lacking in durability, it enjoyed great popularity, especially among Manchu ladies, who delighted in ornate hairpins and elaborate head-dresses with kingfisher-feather decorations. But I have never heard it suggested that this popularity stemmed from any imagined connection between the kingfisher and the "blue-bird" of poetry.

Our most reliable source of evidence in the case of azure-winged magpie *versus* common Indian kingfisher may be found by consulting contemporary Chinese students of poetry, who proceed to throw out both aspirants, together with all others. The best authorities are sure that there is *no* bird that corresponds to the "blue-bird." They believe that it is purely legendary and that no specific bird was ever meant, and, perhaps, it is not important.



The legend is complex, arising from two myths of the Chou dynasty (*ca.* 1027-256 B.C.). According to one, Mu Wang, the early monarch who is supposed to have reigned from 1001—946 B.C., was reported to have traveled to the far West where "blue-birds" were. Another distinct legend told that the same ruler made a journey to visit the Mother Queen of the West. In the Han dynasty (206 B.C.—A.D. 220) these two myths were combined to give the idea that Mu Wang had found the "blue-birds" of the mysterious Mother Queen. By the T'ang dynasty (A.D. 618-906) the legend appeared as a romantic story with "blue-birds" acting as messengers between Mu Wang and the Mother Queen.

If we adopt the opinion of present-day scholars, we must conclude that the "blue-bird" of Chinese legend and literature is as fabulous as the phoenix, and that it would be incorrect to identify it with any existent bird.

Whereas the "blue-bird" is an elusive figment of poetic imagination, the wild goose and the carp have corporeal form. In Nature both are well known to the Chinese.

Some of the most common wild geese in North China are the western bean goose, *Anser fabalis fabalis*, and Swinhoe's bean goose, *Anser fabalis serrirostris*. Another regular migrant through the North China region is the swan goose, *Cygnopsis cygnoides*, which for thousands of years has been tamed by Chinese farmers. It is not known, however, whether the many varieties of domesticated Chinese geese are descendants of some one species of wild goose, or whether they

**A civil official's Mandarin square with the wild goose, emblem of the fourth rank. As usual, the craftsman failed to show the bird as web-footed. Corliss Hathaway photograph. Author's collection.**

have had various origins.

In legend the wild goose is featured in a delightful tale about Su Wu of the 2nd century B.C. While being held by the warlike Hsiungnu on the northwestern frontiers, Su Wu managed to fasten a letter to the leg of a wild goose, which later in its southward migration was shot by the Emperor himself, who was hunting in the Imperial pleasure grounds. Whereupon the Emperor sent his envoy, who effected the release of the captive.

This story seems to have established the wild goose in the role of message-carrier. Again and again Chinese poets refer to it in this capacity as we see from such quotations as these:

"There are no more messengers I can send him,
Now that the wild geese have turned south."
—Wei Chuang

"The wild geese never answer me." (that is, bring me letters)
—Tu Fu

"Oh, to send you this message, this pair of jade ear-rings!—
I watch a lonely wild goose in three thousand miles of cloud."
—Li Shang-yin

"At last I can send my messengers—
Wild geese, homing to Lo-yang."
—Li Shang-yin

From early historic times wild geese held a fascination for the Chinese. A superb example of this may be seen on the pottery tiles from tombs of Western Honan, dating about the 3rd century B.C. With admirable realism the geese are shown in flight.

Chinese bird painters have made the wild goose one of their favored subjects. Scrolls depicting wild geese remain from the T'ang dynasty (A.D. 618-906) and the great Sung dynasty (A.D. 960-1279), as well as from more recent periods.

Another place in which the wild goose was displayed was on the Mandarin squares of civil officials. Quite early during the Ming dynasty (A.D. 1368-1644) laws were made regulating the insignia to be worn by the nine ranks of officials, both civil and military. In the list of birds to designate civil officials, the wild goose was specified as the emblem for the fourth rank. This custom prevailed not only through the Ming dynasty but also through the Ch'ing.

In China it is commonly believed that geese mate for life, so they have become a symbol of married affection. Sometimes a pair of geese are to be seen in the wedding procession. I know of an American bride who went out to China to marry a man in

**Two Geese: painted in monochrome on silk. Ming dynasty, probably 16th century. Courtesy, The Metropolitan Museum of Art.**

government service. When she reached her new home in Peiping, she found that her husband's Chinese servants had provided a pair of pink geese in order not to overlook any of the proper appointments and customs connected with a wedding.

As is highly fitting, the postal service has at different times given recognition to the ancient legend of the message-carrying wild goose. For instance, the postal flag bears the likeness of a goose. An even earlier appearance of the wild goose was on the $1, $2, and $5 stamps of the Imperial Chinese Post in the issue of 1897.

In the same issue the carp, the messenger fish, appeared on the 20-cent, 30-cent, and 50-cent stamps. The carp and the wild goose were also on the stamps of the 1898 and 1902-1910 issues with certain differences in color, and the last-mentioned issue was over-printed in 1912 for the use of the newly established Republic.

The idea of the carp as a message-carrier was recorded by an early poet (probably of the Han dynasty, 206 B.C.—A.D. 220) who told how he "was brought some carp by a boy and, cutting one open, found in its belly a letter from his beloved, declaring her love and wishing him happiness." Later poets have carried on this fantastic legend, as we see in the following line from Li Shang-yin:

"I send you a message carried by two carp."

Another legend credits the carp with leaping the Lung Men, or Dragon Gate, on the Yellow River and being transformed into a dragon. In the days of the Imperial examinations the Bachelor of Arts (*hsu ts'ai*) candidate was said to have leaped through the Dragon Gate if he passed successfully and became a Master of Arts (*han lin.*) There are frequent references to this legend in the arts and crafts of China. In embroideries and on porcelains we see leaping carp, and often the dragon is represented in an upper stratum of clouds.

By itself the carp forms a favorite motif. We find it not only in paintings but also in objects of ivory, jade, and wood. Even such craftsmen as metal workers have used it, and we have handsome pewter dishes with lifelike carp decorating the lids.

In real life the common carp, *Cyprinus carpio*, L. is abundant in the water-ways and lakes of China. It is one of the most ordinary items of food, and evidently has been from very early times. One of the twenty-four stories about filial sons tells of Chiang She of the Han dynasty, who, with his wife, gratified every whim of his elderly mother. In doing so, they walked long distances to fetch her a certain kind of drinking water. They also went to much trouble to provide her with minced fish of which she was exceedingly fond. Finally they were rewarded for all their pains when beside their dwelling a spring burst forth, and to their delight it had exactly the right flavor. Moreover, every day a pair of carp leaped from its bubbling waters! It is not related whether any of them ever brought messages to the selfish old woman. Even if they did not, the legend of the poet's fish put the message-carrying ability of the carp on such a firm basis that no additional evidence is necessary.

So the carp, the wild goose, and the "blue-bird" stand as unique legendary message-carriers.

**Carp painted on silk. Ch'ing dynasty (1644-1912). Artist unknown. Collection of William Rockhill Nelson Gallery of Art, Kansas City, Mo.**

## View of Chocorua

*By* DANIEL SMYTHE

The mountain past our front yard holds
Its presence on the sky.
It has the winds and rains in folds,
As the swift day goes by.

The slopes that stand their silent ground,
The birds that haunt its aisles,
Are poised by distance, without sound
Across the mountain miles.

**Joan Harris, videogenic wife of Norman Harris, treats Herkemiah, who made his television debut as a baby, to a cucumber during the "Living Wonders" TV show.**

# "Living Wonders"

*By* LOUISE DYER

SINCE October, 1948, WBZ-TV, Boston, has presented a Nature program of wide popularity. Norman D. Harris, who combines a highly trained background with an awareness of audience demands, originated and presents this show to the video audience. He calls it "Living Wonders." It is a spontaneous, unpredictable, family program, rich in both humor and information, with never a dull moment and never a line of "script." This innovation is sponsored by the First National Bank of Boston. It received the only 1949 George Foster Peabody Award for an educational program in either radio or television in New England. In fact, this is the only Peabody Award so far to be given to TV in New England. "Living Wonders" was voted the best local TV program by readers of the *Boston Sunday Advertiser*, and nosed out all network educational programs to head the first Annual Awards Poll of the New England edition of the magazine, *TV Forecast*.

Harris has an able assistant in his wife, who majored in zoology at Mt. Holyoke College. What Mrs. Harris brings to the screen, in addition to technology, may be gathered from a conversation overheard at the University Club of Boston. Two men were speaking near a television set.

"So you watch 'Living Wonders' program?"

"I never miss it," came a most emphatic response.

"I didn't realize that you were interested in natural history."

"I'm not. But, say! Have you seen this fellow's wife?"

Several years ago, when Harris saw his first video, he exclaimed, "*That* is one way to teach natural history!"

He convinced WBZ-TV that the show he wanted to put on, using at least one live creature each evening, would appeal to the public. The program soon proved its popularity when a contest for names for two baby hamsters brought the station a record response by mail.

When a prospective sponsor wanted to rule out all snakes and spiders, Harris would not submit to the restriction. Fan mail has since shown a great interest in these two subjects, perhaps because they may be safely and comfortably studied on the TV screen. Harris takes satisfaction in disproving such superstitions as that bats love to tangle in women's hair, that porcupines throw their quills, and that snakes are slimy and sting with their tongues.

A graduate of Tufts College, Harris also holds an M.A. from Harvard. For seven years he taught science at private schools, and was Nature counsellor

**The video audience is introduced to "Miss Velvet" a giant tarantula from Santo Domingo**

at summer camps. He is now Director of Education at the Boston Museum of Science. Both supervision of the Museum Camp Tours and lecturing throughout New England with live specimens, give him hundreds of vital associations.

Many of the friends thus acquired give their lively cooperation to "Living Wonders." The Harvard biologists at Woods Hole, where Harris studied one summer, have sent live crabs, star fish, sea-cucumbers and sea-anemones for a marine life program. When a giant cockroach was desired it was supplied by a research professor at Tufts College. From an animal farm in New Hampshire came a pet armadillo whose owners said that, although they had taken care of it for a year and a half, they had never appreciated its unusual interest until they saw their pet in TV close-ups. Pet farms, turkey farms, lobster dealers, banana importers who occasionally find a tropical spider, snake, or mouse-opossum, or the Zoo, the Aquarium, the Sportsmen's Show and the Circus, have all sent some living wonder to make its television debut with Harris. Many more performers come from friends of the program, or friends of friends, like Rosebud, a tame and denatured skunk; Esmeralda, a two and three-quarter pound Louisiana bullfrog; Herman, the crow; Herkemiah, a tame porcupine, which appeared as a baby on the program and is now a pet adult at the Museum.

Subjects vary tremendously in size and type. They cover insects — the praying mantis, bumble-bee; spiders — the tarantula, the black widow; mammals — chinchilla, sea-lion, raccoon, mink, pygmy hippotamus, bats; marine life — sea turtles, crabs, snails; birds — Miss Kelley (the sparrow hawk), ducks, owls; reptiles in great variety. On one program all thirteen New England snakes were shown, including a lively timber rattler. TV officials who doubted the excitement in this type of show were elated when a diamond-back rattlesnake on one show struck the "mike" killing it and necessitating the use of another, and the incident was reported in radio and newspapers the country over. Birdhouses were made and discussed on a spring program; bird-feeding stations were exhibited in snow-time, and one fall evening, while mosses, ferns and salamanders were still available, a terrarium was assembled.

Museum material often points up a program. Silhouettes are shown, like the form of a flying squirrel when gliding. A live armadillo was contrasted with a mounted specimen of the African pangolin. The quill of the porcupine was explained by using a three-foot wooden model. Camouflage was beautifully illustrated by holding an owl against a large section of tree bark, when the bird became practically invisible.

The camera is important both on and off the program. Phases of a topic that cannot be produced in the studio are shown by using films that Harris has taken for the purpose, slow-motion bird flight, for example. The studio camera work is fascinating and expert, switching instantly from a view of Harris and his animal-star to such unusual shots as a close-up of a hummingbird's tongue; the fangs of a tarantula; the owl's third eyelid; the webbed foot of a muskrat; the retractable claw of a lion; the egg-tooth on a newly hatched chick; the ludicrous rotating whiskers of a sea-lion: the mobile expression of a young raccoon. And where else would one be likely to see the beating heart in a three-day-old chick embryo?

The program has three definite assets, in addition to excellent material. There is genuine humor, sometimes planned, sometimes spontaneous, always delightful. More often than not a surprise creeps in. A huge spotted egg, which the audience had been urged to guess about, was opened on an Easter-time program after a succession of bird eggs had been shown, and what should appear but a live, black, baby bunny in one half and a little white bunny in the other half! Mrs. Harris was asked to demonstrate how a butterfly

**Myrtle, a forty-pound snapping turtle, poses with the Master of Ceremonies for the TV camera.**

emerged from a cocoon, which she did by showing what looked like a large specimen.

"Now, when he is ready to come out," she said, "he just opens his zipper."

Whereupon she unzipped the "cocoon" and off flew a huge paper butterfly.

The third asset and the most vital charm of the program — and it is always evident — is a genuine love of animals, which is as natural to Harris as breathing. The audience feels it and responds. A baby bear, both homesick and carsick, and away from home for the first time, was completely miserable until he got into Harris' arms as he was taken on the set. Immediately, he seemed to sense a friend, stood up as pert as a pickle and kissed Harris on the cheek. A lion cub, considered by his keeper not quite old enough to play, liked Harris so much that he indulged in his first frolic right on the program.

Does all this sound easy? It is as full of problems as the United Nations! Hours of work, miles of travel, tons of patience, ingenuity and infinite pains are the toll of this successful weekly twenty minutes on video. To show a hamster in hibernation one had to be procured from the Harvard Medical School, kept in the refrigerator, carried to the studio packed in ice-cubes and unpacked just a minute before curtain time. Incubating turkey-eggs, planned to hatch on the program, were transported from the incubator to WBZ in a fireless cooker. A year and a half of planning and miles of red tape were required to import giant Atlas moths from India to emerge on the show. They were ordered long ahead and were flown over. One precocious moth came out too soon and was kept in the refrigerator until TV time to prevent damage to its wings. It is evident that such a program can be planned and partially controlled but never guaranteed. It depends fundamentally on the resourcefulness of its M.C.

Incidentally, to the many people with incomplete experience who vigorously assert that television is all blah, bunk and boo! with cream-pie-in-the-face acting, "Living Wonders" is one answer. Here is a wholesome, delightfully unpredictable program that the whole family can enjoy and from which it can profit. And, as Norman Harris says, it teaches natural history.

# Weather Wisdom

*By* R. F. ARMKNECHT

The birds began their southward flight;
  Brief hoarfrost silvered lawn.
  "The summer's surely gone,"
I said to Caleb, "Snow might come tonight."
But, weatherwise and ancient, he would say,
"No, sonny, winter's still a piece away."

The leaves grew tawny, red or gold,
  The morning keen with frost.
  Great honking wedges crossed
Wind-troubled skies — and surely these foretold
The great cold near! But Caleb only said,
"No, sonny, winter's still a piece ahead."

Then came a night-long, throbbing rain.
  The sound of brooks, long dry,
  Was heard once more; the sky
Wept silently, as from an ancient pain.
Then Caleb smiled and murmured, "It's begun.
Just any day you'll get your winter, son."

**Although most of the breeding colonies of cormorants are on isolated, treeless islands, the birds sometimes nest in trees, usually dead ones, building a new nest in about four days.**

# The Return of the Cormorant

*By* N. J. BERRILL

IF YOU live along the Atlantic coast, or along the Louisiana shore, or anywhere close to the upper reaches of the Mississippi water system, you probably know double-crested cormorants. If they are strangers to you, and you see them in flight, you probably will mistake them for wild ducks or geese for they fly in the same long lines. Or if you see some of these birds on a lake the chances are you will think they are loons, for they sit low in the water and dive well. But you have never seen a loon or a duck perch on a channel marker, with wings outspread like a Roman eagle atop a standard. Cormorants are always doing this, although whether it is a case of drying wet feathers or plain exhibitionism is still a subject of argument.

Cormorants are sea birds known across the world, although along the Atlantic coast they have had a checkered history. When white men first settled on this continent, these birds were common from Newfoundland to Cape Cod. There are records of abundance from 1591 to about 1880, and one writer of 1637 describes a string of feeding birds three miles long off New England. But from 1880 to the middle nineteen-twenties there are no breeding records along the whole of the New England coastline, although migrants took longer to disappear. Fishermen took the cormorants

for bait and found them easy targets, while birds were fetching $2.00 apiece for their meat in 1886. At this price it is no wonder their numbers went down.

About twenty years ago, after years of protection, the cormorants started to come back, and there were large breeding colonies at that time on Old Man Island and Marblehead. By 1944 there were at least 10,000 breeders along the Atlantic coast. During recent years their numbers have been judged excessive and the Fish and Wildlife service is trying to bring them under control. Since 1944 close to 100,000 eggs have been sprayed to prevent them from hatching, although without much effect as yet upon the adult population.

Cormorants are maritime fishermen, usually grouped with the darters and the more striking or glamorous gannets, frigate birds, pelicans and tropic birds, all with webs connecting the four toes, and external nostrils that can be closed when diving. Even when the nostrils are open they are small, and this may account for the cormorant's beak being kept open most of the time and for the constant quivering of the throat pouch, like a dog panting to get extra air into its lungs. Yet the plumage wets readily, the tail feathers break too easily, and mating can take place only on land, all suggesting that the cormorants are descended from a stock that is only secondarily aquatic. Yet they abhor the land, except their own rocky territory; will fly rather than walk across a patch of grass; will follow a tortuous, ten-mile water course to a feeding ground rather than take a short cut across a neck of woods.

Cormorants sit low in the water, with only the head and neck usually visible, all set for a fast turn-over dive to the sea floor. It is a quick, slick movement, and a contrast to the prolonged and noisy take-off into the air. Then, for a hundred feet or more, the wing tips splash against the water, until finally they clear and the bird wings its low, unswerving flight over the sea. Only when the journey is long is the effort made to gain height.

Diving generally takes place in fairly shallow water, for a dive rarely lasts for more than half a minute.

**If a tree is not already dead the toxic excrement of the birds will soon kill it.**

Nevertheless, the fish that are caught are almost entirely bottom dwellers. Along the coast the prey are usually sculpin, cunner and gunnel; in fresh water more likely catfish or suckers. There is little consumption of either commercial or game fish. In fact, these water birds do much to keep down the numbers of egg-eating fish in both fresh and salt water, and what damage they do is not great. Immature birds, and these alone, are inclined to be a nuisance, and are likely to cause some damage to fish within the pound nets. But such difficulty is local, and there is no trouble at all when gill nets and hoop nets are employed. We should not begrudge young cormorants the few herring they get, and it does seem that the so-called egg-spray control is hardly warranted.

Men of various races have exploited these birds. They have been eaten by Indians for a long time, and cormorant remains are the commonest in old kitchen middens at Old Point in Lamoine county. Hunters used to steal out to the rocky islets where they slept and club what they needed, although being wiser than their successors they took no more than needed, and then raised a shout to scare the rest away to safety for the remainder of the

**A hungry young but well-grown cormorant on the nest. This picture shows the gular patch of the bird.**

night. In the Gulf of St. Lawrence, along the Labrador shore, cormorants are still used by the Indians as meat, although mainly to feed sledge dogs and captive foxes. The birds' eggs are taken, too, by local residents, and outside the sanctuaries the slaughter here is heavy. Similar cormorants excrete the guano of the rich beds that are a source of wealth to Peru. Perhaps the oldest use of the birds is the practice — started in Japan in the 6th century and some five hundred years later in China — of tying a loose cord round the neck of a cormorant, loose enough to let it breathe but tight enough to prevent it from swallowing fish. Thus leashed, the birds are allowed to dive and catch fish for their human owners. The cormorant eggs are taken and hatched under hens, and the birds are semi-domesticated.

Breeding colonies along the coast are for the most part on isolated, treeless islands. In Maine, most birds use cliff shelves for their nests, but here and there nests are made in trees, usually dead trees. In any case a nesting tree will soon be dead because of the toxic scorching of the cormorants' excrement.

Nest building takes little time; four days if a new one, or half that time if being made over. The male helps only in bringing in building materials; rockweed, kelp, and debris for foundations, sticks weedstalks and flotsam for the remainder. Four eggs are usually laid, although the number may be fewer, and hatching occurs after about twenty-five days of incubation. Possibly because it is comparatively difficult for a cormorant to take to the air, the young stay in or close to their nest until they are practically full grown, and it is six weeks before they can fly.

During the first day after hatching, the mother regurgitates food into the mouths of the hatchlings. Later on, and only when the parent gets good and ready, it lowers its head and the youngster sticks its own head down into the gullet. But the more clamor it makes the longer it usually has to wait. After three or four weeks the youngsters join in flocks and wander around the colony, but they still return to the nest to be fed by regurgitation by the parents.

Immature and non-breeding birds in general are not tolerated in the breeding colony, and, as with the gannets, must set up bachelor colonies.

But in the breeding colony the parents have their troubles. There are close neighbors and some of them are far from friendly. There the black-backed and herring gulls, being more catholic in their feeding habits, sometimes eat the cormorants' eggs or young while the associated eider duck attends to its own business.

It is suggested that the gulls are tolerated because they serve as watchmen for the colony. They certainly do act in this way, for they are intelligent and alert birds that rise at the first sign of alarm, and the cormorants follow. But it is probably closer to the truth to say that they are tolerated because a brooding cormorant cares for nothing but its own eggs and offspring, and has never learned communal action. Probably they gain as much as they lose from the association and the involuntary guardianship compensates for the gull's destructive habit. At any rate, herring gulls have the reputation of rising to give false alarms, causing the cormorants to take to the air, and then swiftly descending to gorge on abandoned eggs and babies. This may very well be true, for these gulls, for all their soaring beauty, are fast, intelligent bird-eaters, as well as eaters of almost anything else. They even stand guard along a shore at dusk and take a heavy toll of petrels coming in for the night. These fall an easy prey, with their awkward, erratic flight.

Where the herring gulls go, the black-backs follow, and the combination is a deadly aggressive menace to most other sea-bird communities. Control of the rapidly spreading gull population of the New England shore is as justified as cormorant control is dubious. Where the gulls take over, the petrels and terns depart, which is regrettable, for variety is still the spice of life. But it took special forms of depredation to get things going. Only when the black-backs began killing young eider ducks in Penobscot Bay, and herring gulls began raiding the blueberry barrens, was the voice of humanity heard. More than a half million gull eggs have been sprayed during the last fifteen years, and it may be that their numbers can be held in check.

In the fall the cormorants of Maine begin to leave the waters of the north, and, in preliminary premigratory exercises, fly in large numbers to Merrymeeting Bay, as though they knew a good name when they found one. The southward movement reaches its peak in September and October, falls off in November, and all birds, immature and mature, winter between Cape Cod and Florida. This migratory movement is matched by the other group of double-crested cormorants. The thousands that breed on the lake islands of the plains at the head of the Mississippi waterway system, follow that river to the coast and winter along the shore of the Gulf of Mexico. In the spring the flight lines reform, and the northern coasts and lakes see the double-crested cormorants once again.

# Emily Sartain —

# "Wildflower Woman"

*By* GILEAN DOUGLAS

★

Emily Sartain

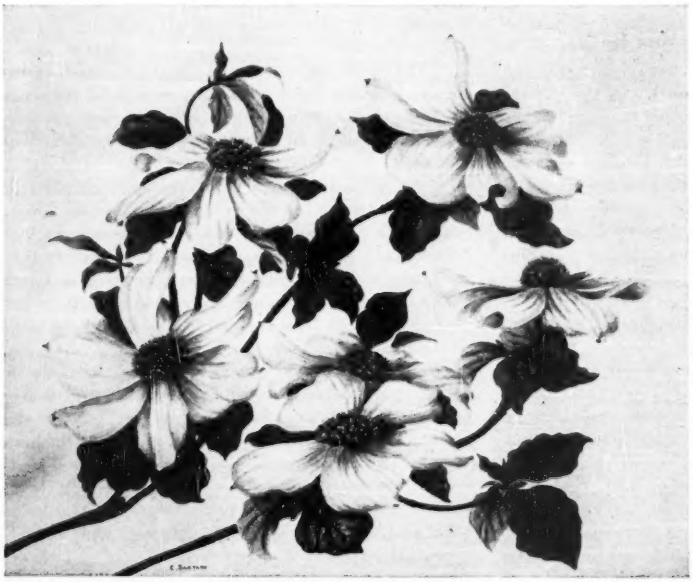
IN BEACON Hill Park, Victoria, British Columbia, spring throws down a wildflower carpet that no loom has ever equalled. Purple satin flower and violet, pink shooting star and fringed cup, spring gold, chocolate lily, blue camas and larkspur, white saxifrage and dogtooth lily — even Persia could produce nothing like it.

These blossoms are interspersed with buttercups, daisies and sorrel, which give the carpet a reddish tinge and harmonize the whole. As some of the earliest flowers fade, their places are taken by the creamy poison camas, a later variety of blue camas, the sunny Indian consumption plant, and sometimes a few glowing roots of spring sunflower. Surrounding all this are bushes of golden broom and scrub oak trees, with a salt wind from the Strait of Juan de Fuca spicing everything.

So it is no wonder that Emily Sartain, the wildflower artist, has made Victoria her home. You will find her any day of any season walking bareheaded along the shore, watching a fluffy cygnet full of baby awkwardness, or simply strolling beside the wildflower carpet.

"So much beauty everywhere," she exclaimed, "and so few who ever see it! How can we think we have lived if we have not come suddenly on a new wildflower in a cool, quiet wood, or ached to copy the fine pencil strokes of bare trees in winter against a blue sky, or felt our hearts go out of us because a steam train puffed slowly through a meadow at night? Rainbows, waterfalls, quiet pools — they mean so much to me. And flowers, of course. Flowers most of all."

Blue-eyed Emily painted her first wildflower at the ripe age of seven, and by the time she was in her teens was haunting woods and fields to find her models. Soon she had a studio in Sussex, right on the south coast, with the English Channel on one side and the rolling South Downs on the other. Here she began to work on a series of Sussex blossoms, but it never materialized because each picture was sold as fast as it was finished. Here, too, she painted "Summer Flowers," a study of pink snapdragon and blue delphinium that was her first exhibited painting. It was hung in the Royal Institute Galleries at an exhibition of the Society of Women Artists, and was purchased by Queen Mary of England shortly after the showing opened. Queen Elizabeth now owns a Sartain watercolor of wild roses, and H. R. H., Princess Alice, Countess of Athlone, has a painting of the lovely Pacific dogwood. Lady Hope of London, Lady Templemore of Arlesford, Sir Courtenay Vyvyan, the Marchioness of Abergavenny, and other notables, began to collect the work of this gifted



**The Pacific or western dogwood. The original of this painting is owned by H.R.H. Princess Alice, Countess of Athlone.**

**The original of Miss Sartain's painting of the skunk cabbage is owned by Mrs. Albert Tippens of Chicago.**

artist and informed botanist.

In those days when English people spoke of flowers they thought of Emily Sartain of the dancing eyes and gold-brown hair. The Royal Horticultural Society hung five of her paintings, and went on to award her three bronze medals and make her a Fellow. Flower shows hardly seemed complete without her.

"Chelsea Flower Show," she told me, laughing, "is a combination of fairyland and heaven!"

In 1939 the Peninsular and Oriental Steamship Company commissioned Miss Sartain to paint fourteen designs to be used as floral menus aboard their famous liners. Months of research produced outstanding watercolors of the representative flowers of England, Scotland, Ireland, Wales (the daffodil), France, the Sudan (the gum arabic tree), China, Japan, Ceylon (the beautiful blue *Exacum zeylanicum*, for which no one has found a common name that is lovely enough), Malaya (orchids), Australia (the golden wattle), New Zealand (the yellow kowhai, with a background of tree fern leaves), Egypt (the blue lotus) and India (the pink lotus or nelumbium). On the menu for the Sudan both the flowers and seed pods of the gum arabic tree were depicted. These flowers resemble the mimosa — little, fluffy, yellow balls — and the seed pods are in shape like those of the laburnum, but silvery white and looking like ropes of small pearls—flowers that always bring inquiry as to what they are and what part of the world they come from.

Then came the war, and the P. & O. ships went out on errands that had nothing to do with flowers. The original designs were casualties of the Blitz, but the plates that had been made from them were saved, and almost exactly ten years after the paintings were finished they set out to sail the seven seas, as had been originally intended, delighting passengers traveling to the far places of the world, and introducing them to the flower of the world.

It was in 1939, that Miss Sartain left England to visit her sister in Canada for six months — and stayed for eleven years! Her brush earned more than $4000 for war relief organizations in the maple leaf Dominion, and her water colors were exhibited across the country. Radio audiences enjoyed her talks on wildflowers, and the press acclaimed her as one of the world's foremost flower painters. Her wildflower reproductions appeared in the stores on greeting cards and hasty-notes. In 1947 almost 100 paintings of the wildflowers of British Columbia were on exhibition in Victoria for three months to enthusiastic Canadian and American audiences, and her fame spread even more widely among lovers of the beautiful.

This vivacious woman works a twelve to fifteen hour day, and loves it. She uses one of the most difficult mediums, that of transparent watercolor, and it could be said of her, as of Margaret Lane's "Beatrix Potter": "She drew like a naturalist; no leaf too modest, no twig too small for her attention." Her paintings are a joy to the botanist and horticulturist, as well as to the artist. Even when viewed under a powerful microscope they are flawless in their detail. Her white flowers painted on a white background are amazing. As one critic puts it:

"The modelling of these so that they detach themselves from the paper and almost seem to fill the room with a delicate perfume is so subtle as to defy analysis. The flowers rise from the paper with a third dimensional effect."

"My methods are really summed up in simplicity," Emily told me in her soft voice. "Give me the flower, my paper and paints — and I'll produce a Sartain original. I suppose the other requisites are endless patience and deep concentration. So long as I can work in a quiet atmosphere, with green fields, trees and flowers near me, I am happy. Best of all I love a combination of sea and country."

Best of all she likes to go out along the shore or through a meadow and find a strange flower, or hear a strange bird singing. But that rarely happens for she knows every note and petal almost as well as she does her own voice and face. On forest trail or river path she is always surrounded by friends. One who loves and understands Nature is never alone, wherever he or she may be, and Emily Sartain, "the wildflower woman, is such a person.

**Some gem stones of the southern Appalachians. Across the top of the picture are smoky topaz, rhodolite, amethyst, aquamarine and a group of white topazes. Right, center, are five Australian opals. Lower, right, is an almandine garnet, and the small round stones are pyrope garnets, Lower, left, is a white sapphire, with other similar stones shown elsewhere in this collection.**

# Gem Stones of the Appalachians

*By* ASHTON CHAPMAN

*Photographs from N. C. Dept. of Conservation and Development*

DURING the 1870's, a worker panning gold in Todd's Branch near Charlotte, N. C., found a black crystal "as large as a chinquapin," which he and his fellow workers decided must be a diamond. Having heard that "nothing is harder than a diamond," but not realizing that diamonds cleave rather easily under heavy pressure, they decided to test the stone's genuineness by laying it on a blacksmith's anvil and pounding it with a sledgehammer. When the crystal shattered under the blow the finder concluded it had been worthless. Experts later identified the fragments as parts of a genuine diamond.

The Department of Conservation and Development of North Carolina reports the finding, at various times, of thirteen other authentic diamonds — but no more black ones — in the Blue Ridge foothills of that State. All were isolated specimens, One, uncut, is on display in the State Museum in the capitol at Raleigh. The largest, discovered in 1886 near Dysartville, weighed four and one third carats.

According to the Department of Mines, Mining and Geology of Georgia, one or more isolated diamonds have been found in sixteen counties in the Blue Ridge foothills of that State. But, the Department states: "Most of the finds lack satisfactory verification, and in some instances . . . other minerals, as very clear quartz crystals, have been honestly mistaken for diamonds. However, there are a few well authenticated

**Roby Buchanan, Hawk, North Carolina, lapidary, holds a huge piece of brown quartz — cairngorm or smoky quartz topaz "in the raw." Quartz occurs naturally in such interesting shapes.**

finds, which places the existence of the diamond-bearing rock in Georgia not beyond the bounds of probability."

The first real diamond found in Georgia was reported in 1843. In the early 1900's the finding of a genuine diamond in Alabama, a short distance from the Georgia line, was reported.

Most of the localities in both North Carolina and Georgia from which diamonds were reported have been systematically searched, but no further evidence of diamond crystals, or the ordinary association of diamonds, has been found. The investigating geologists state: "As these diamonds have all come from the same general topographical area, they must have originated at some common point on higher ground and were washed down, along with decomposing rock soil, during spring freshets."

As it was just such random discoveries of diamonds that led to locating the area in Arkansas that has produced a reported 48,000 diamonds of various sizes, it is not beyond the bounds of probability that a diamond-bearing area may some day be located in the lower Appalachians. This region, however, has produced a quantity of other precious stones, including emeralds, rubies and sapphires, and a wide variety of semi-precious gems that sparkle and glow when properly cut and polished to make real gems from them.

North Carolina has been called "Nature's specimen case," because nearly 300 different minerals — a larger number than in any other area of similar size — occur within its borders. Nearly a dozen of these minerals were first identified in North Carolina, and one — hiddenite — has been found nowhere else in the world. More than thirty are classed as gem minerals. The list of gem stones found in Georgia is more limited, and the quantities so far produced are somewhat smaller.

Many of the important mineral collections of the world include specimens from North Carolina, notably the National Museum in Washington; the American Museum of Natural History, New York; the British Museum, London; the Imperial Museum, Vienna; the Musee de l'Histoire Naturelle, Paris; and innumerable private collections.

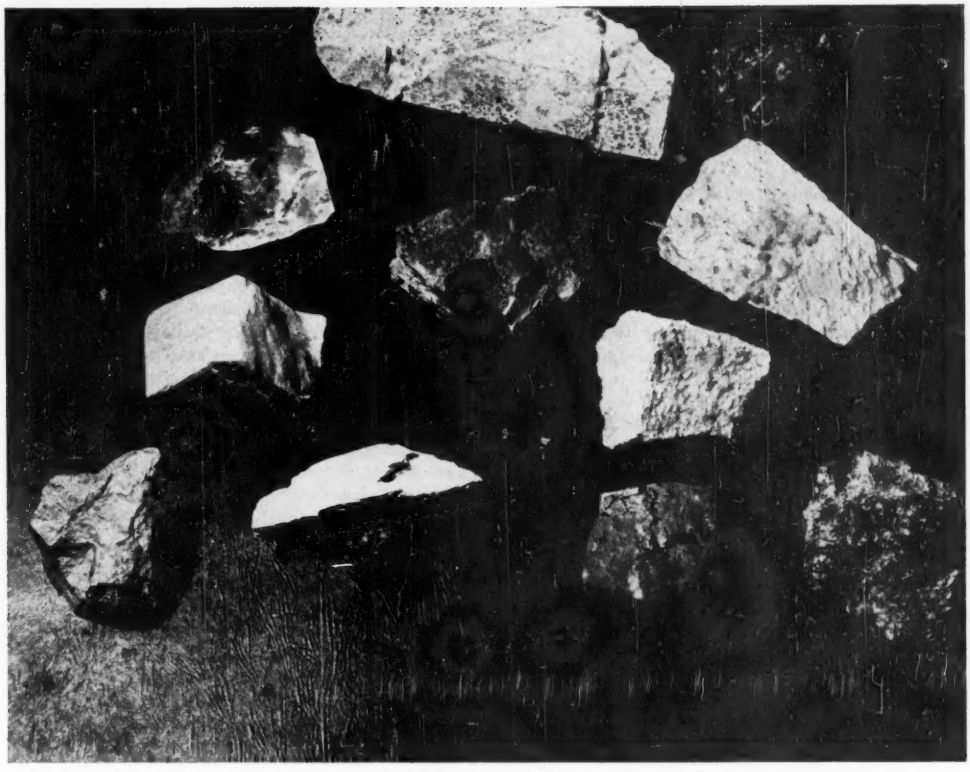
Gems found in both North Carolina and Georgia, in addition to a limited number of diamonds, include rubies, sapphires, garnets of various types, amethysts, moonstones, rutile, kyanite, and several forms of chalcedony. Gems have been cut from clear, opalescent, rose, smoky, and rutilated quartz from both states. Lazulite has been reported as found in this country only in California, Nevada, North Carolina and Georgia. Of an azure-blue color, it resembles lapis lazuli, with which it is sometimes confused.

Little or no mining, exclusively for gems, has been conducted in Georgia, but in North Carolina emeralds have been mined at Stony Point and near Little Switzerland; rubies and rhodolites in the Cowee valley; sapphires at Corundum Hill; amethysts in Macon County; hiddenite near the town of the same name. However, the majority of North Carolina gems have been found accidentally in connection with mining for silver, gold and copper, and such other commercially important minerals as mica and feldspar.

Prospecting the dumps of these mines has resulted in rich finds for amateur and professional collectors. Tailings from these mines are often used to surface unpaved roads in the Carolina mountains. Thus trucks, cars and pedestrians have sometimes traveled for years over mineral chunks that were later picked up and found to contain important gems.

The first systematic attempt to mine gems in North Carolina occurred nearly a century ago near Franklin, at the Cullasagee mine on Corundum Hill, a whole hill of about ten acres claimed to be almost solid corundum. Here was found what is considered the world's finest specimen of emerald-green sapphire. It measured 4 x 2 x 1½ inches, and was acquired for the Morgan-Bement collection in New York. Blue sapphires have been found at Montvale and near the town of Sapphire. This section of the State has long been known as "the sapphire country." White sapphires have been found at other points in North Carolina.

Of the rubies mined in the valley of Cowee Creek, whose waters enter the Little Tennessee River a few miles north of Franklin, a government report states: "In color and brilliance the North Carolina rubies are



**Raw material for dinner rings. At the top beryl crystal and smoky quartz topaz: next, clear quartz crystal, pyrope garnet in matrix and hyalite. Next is a stone of feldspar and thulite and a specimen of marble. In the lower row are unakite; talc and a small almadine garnet cluster; epidote with iron ore; rhodolite garnet in matrix.**

equal to the Burma rubies. Although many of the North Carolina rubies unquestionably have been fine, most of them have been small and some of them imperfect." However, it is claimed that the percentage of imperfect stones has been little higher than in those of Burma.

When, in 1879, a hitherto unknown type of spodumene crystal was found at Stony Point in Alexander County it was called "lithia emerald," but was later named for the discoverer, William E. Hidden of New York, who had been sent to North Carolina by Thomas A. Edison in a vain search for platinum.

Hiddenite crystals range from colorless, which is rare, to light yellow, to yellowish-green, then into deep yellow, emerald-green. Sometimes an entire crystal has a uniform color, but generally one end is yellowish and the other green.

The first small crystals were found loose in the soil with emeralds, but systematic mining revealed them attached to veins of wall-rock. Gems weighing up to 2½ carats have been cut, and sold for as much as $500. The finest specimen of hiddenite is in the American Museum of Natural History, New York. It measures 2-2/5 x ½ x 1/3 inches. Probably the best collection of hiddenite is from the Colburn Museum, Asheville, N. C., now in the U. S. National Museum. An appreciable quantity of zircon was found in the course of mining for hiddenite. Zircons are also found in other parts of the State.

The discovery of hiddenite is supposed to be the first known occurrence of transparent spodumene. Other colors have since been found in different countries. The beautiful lilac-tinted variety known as kunzite was found some years ago in North Carolina, after being identified elsewhere.

At Stony Point, about five miles from the town of Hiddenite, the first emerald mine in the United States was opened following discovery of the first gem there in 1875. One emerald from this mine, weighing nearly nine ounces, is on exhibit in the American Museum of Natural History, New York.

The mine near Little Switzerland, which has been operated intermittently since shortly after the turn of the present century, has produced some important

emeralds, as well as specimens of emerald matrix.

Geologists are of the opinion that far greater quantities of valuable emeralds can be brought to the surface if these two mines are ever deeply worked.

Several types of garnets are found in the lower Appalachians. North Carolina almandite and pyrope garnets are considered among the finest in the world. Those of a deep transparent red, when cut *en cabochon*, are known as carbuncles. Other types found in North Carolina include grossularite and andradite in various colors, spessartite (brownish red), essonite ( a yellow to brown form of grossularite), and uvarovite (emerald green).

Midway between the almandite and pyrope garnets is the clear, sparkling variety known as rhodolite, violet-red in color. "Like a ruby drop of old wine," it is the official State Stone of North Carolina and probably its most important gem commercially. First identified in North Carolina, it was later found in Ceylon.

Another gem material first identified in the lower Appalachians is unakite, named after the Unaka Mountains astride the North Carolina-Tennessee line, where it was first discovered. It is opaque, its irregular flecks of green, black, pink and white being derived from epidote, hornblende, feldspar, and milky quartz, respectively.

Quartz is widely distributed through the lower Appalachians. The transparent to translucent gem types include, in addition to rock crystal and rose quartz, the beautiful lemon-colored citrine; amethyst; cairngorm (smoky-gray tosmoky-brown); morion (nearly black); hairstone (penetrated with needles of rutile, actinolite or some other similar mineral); and aventurine (greenish, enclosing mica).

Chalcedony, a type of quartz having a waxy luster, includes agate and jasper of various shades, carnelian (red), chrysoprase (green), onyx (having parallel layers of different colors), and sardonyx (brownish-yellow). Moss agate owes its name to inclusions of fern- or moss-like crystals of manganese oxide or other minerals, not actual moss as the uninitiated seem to believe.

Staurolite, the reddish-brown "fairy stone" used for pendants, watch fobs, etc., is found at many places in the lower Appalachians. Their perfect cross shape is due to twinning of crystals.

Occasionally found in the lower Appalachians are transparent to translucent quartz crystals with fluid inclusions; others with clay inclusions. Geologists claim these to be as old as 20,000,000 years. When the positions of those with fluid inclusions are changed, the fluid may be seen moving about in the cavities. William E. Hidden took some from North Carolina to New York to illustrate a lecture in 1882 before the New York Academy of Science, but they froze and "burst with the sound of pistol shots."

Because of its vast deposits of feldspar it is not surprising that such feldspar gems as moonstone, amazonstone, sunstone, oligoclase, orthoclase, labradorite, albite and anorthite are found in North Carolina.

Other gem minerals found in North Carolina include aquamarines, tourmalines, golden beryls, epidote, diopside, apatite, chrysocolla, peridot, serpentine, thulite, malachite, azurite, crocidolite (tiger-eye), hematite, rhodonite (pink, opaque), spinel in various colors, and rubellite (pink tourmaline).

Mineral collectors cut and polish many of the gems of the lower Appalachians. Most widely known is Roby Buchanan, in the village of Hawk, N. C., near the Tennessee line. From his boyhood hobby of collecting "pretty rocks" he advanced, about twenty years ago, to a professional lapidary after he designed his own gem cutting and polishing machinery and harnessed it to the water-wheel of his grist mill, the only power then available. This is believed to have been the only water-powered gem machinery in this country. Several years ago a spring freshet destroyed his millrace and, as electric current had meanwhile been brought over the mountains, he changed to electricity. With his machinery thus accelerated he was able greatly to increase his output of finished gems.

Linton B. Greene is another mineral collector who has developed into a professional lapidary. His exhibit of cut and uncut gems in the town of Spruce Pine has attracted wide attention because of its variety.

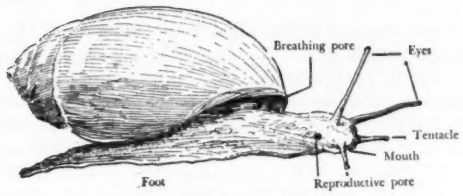
★

# Twelve Years' Old

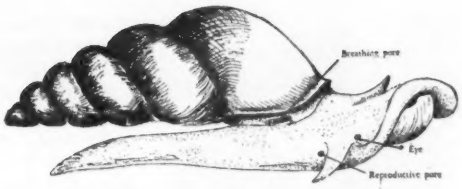
*By* HELEN SMITH

I'm glad I wasn't reading when the bus
Turned suddenly (my book was in my hands)
And then! I caught a glimpse of other lands:
In the October sunlight every tree
Shone like a sovereign; and every cloud
Was like a castle, faery blue and soft,
Soft in the creamy purple haze of sky,
The soul of every place I long to see.

I'm glad I wasn't sleeping on the night
When the moon wept and all the little stars
Were turned to mist (I mean the night it rained).
My window, glistening with tiny drops,
Showed every street lamp's brightness strangely blurred,
The wind became a hand — it made the trees
Tap the four corners of our darkened house,
Like frail old women clinging to the walls.




PARTS OF A LAND SNAIL



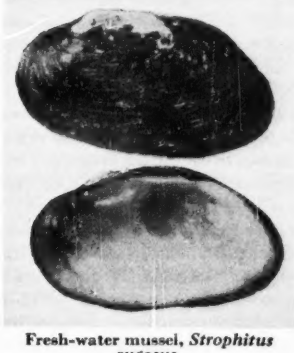

PARTS OF A POND SNAIL

# Mollusks of Land and of Fresh Waters

*By* E. LAURENCE PALMER

**Fresh-water mussel, *Lampsilis siliquoidea.***

**Fresh-water mussel, *Sphaerium fallax.***



**Fresh-water mussel, *Strophitus rugosus.***

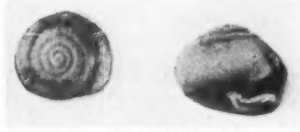
*This is the fifty-ninth in* NATURE MAGAZINE'S *series of educational inserts.*

WHILE we hope that most of the inserts in this series will find a wide usefulness by persons of varied interests and over a wide geographic area, we deliberately try to consider the season in which the particular insert will first appear. Since this unit will appear in the winter it is appropriate that we consider some subject the illustrative material of which may be found in winter. Since it has been some time since we have had an insert dealing primarily with invertebrate animals, it is reasonable that we consider them at this time. Thus an insert on the mollusks of the land and of fresh waters meets our needs.

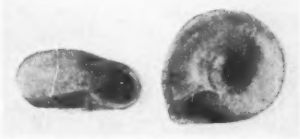
We have no thought of making the treatment of this subject primarily academic. It is probable that everyone who is reading these words is using parts of a land or fresh-water mollusk right now, or has used one recently. It is probable that everyone who reads this has seen some of these animals at some time, either in the markets, in streams, on sidewalks or elsewhere. Really, then, this insert will merely widen to a degree what you already know about some part of your environment.

Surreptitiously or otherwise, examine the buttons that are on your shirt, or that hold your underwear to your body. It is possible that these "pearl" buttons show no sign of being composed of layers of material, that they are really made of some plastic or other artificial material. The chances are also good

**Fresh-water mussels. (1 and 2), *Anodonta grandis;* (3 and 4), *Elliptio dilatatus.***



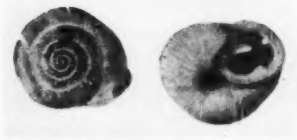
**Land snail, *Ventrides ligera.***



**Land snail, *Haplotrema concavum.***

Land snail, *Allagona profunda.*

Land snail, *Mesodon zaletus.*



Land snail, *Triodopsis tridentata.*

Land snail, *Mesomphix inornatus.*

Land snail, *Stenotrema hirsutum.*

Pond snail, *Helisoma trivolvis.*

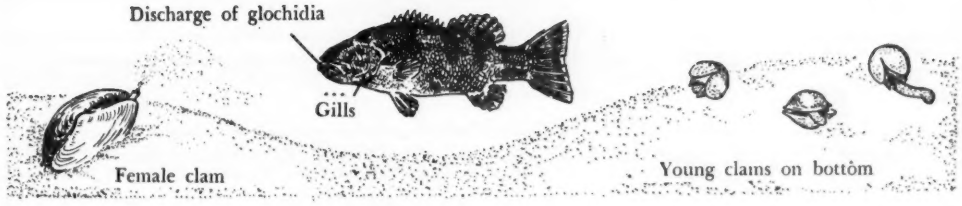
that the buttons may have been cut from the shell of some fresh-water mollusk that lived a most interesting life in the bed of some mud-bottomed stream that made its leisurely way through our countryside.

Sidewalks in summer are almost invariably netted with the gleaming trails of mucus left by slugs that prowled during the cool and moist night in search of their food. Muddy bottomed streams and lakes often show the trails of snails and mussels that made their way, with the help of a single foot, in the direction that may have suited whatever fancy they may possess. Markets in some of our larger cities may display baskets and trays well filled with good-sized, coiled snails that are roasted and eaten by those who have a taste for such things. If we become acquainted, directly or vicariously, with life in some of the areas where our soldiers had to go in World War II, we learn of the slugs and snails that swarmed through moist jungles, frequently seriously injuring human beings over whose bodies they crawled. We even may have learned that the disease schistomiasis may be contracted through contact with snails closely related to some that live in our own environment. And so, whether we limit our interests to the places where we may live, or expand them to the places where we think we might want to live, there is reasonable certainty that a fresh-water snail or a land snail may enter your life. There is even some possibility that it may shorten your life, or the life of domestic animals that are valuable to you. We cannot, then, shove these animals aside as unworthy of our attention. Some of the world's happiest hobbyists center their spare time largely around collecting and studying these animals. Reference to these persons has been frequently made in my writings because my wife is a shell collector of the first water, and I have frequently learned the hard way that the best shells may be found in the most outlandish parts of the world, and that enough of them piled into a pack sack may pose a real problem for a weary hiker.

To a farmer a land mollusk may be a serious pest, and this holds whether the farmer raises food crops or is the type of farmer who belongs to a garden club and raises posies. Each may fight the pests by using poison or by making the pests exhaust their mucus by using barriers of dust or fine ashes over which the little beasties cannot crawl. A liver rot of sheep in some parts of the world is traceable directly to some right-handed pond snails that harbor parasites whose life history calls for an existence in the sheep and in the snails. You who listen to the radio know how widely the role of the shells of mollusks is emphasized as a part of a diet for chickens. Also you know that some of the soft parts of some fresh-water mollusks are used in chicken feed, being obtained as by-products of the industry that uses the shells of the animals to make the pearl buttons that hold your clothing together.

Mollusks of the land and of our fresh waters play an important role in the success of wildlife found on the land and in water. Teals, mallards, black ducks and even grouse feed freely on mollusks of land and water, even though in so doing some of these meals may be the means of introducing gapeworms and tapeworms into the systems of grouse, at least. The food of suckers that some of us may eat may at times be ninety percent mollusks, and even the common pumpkinseeds that youngsters young and old like to catch on worms or flies may depend on mollusks for at least half of their diet. Raccoons, skunks, shrews, muskrats, or minks may eat mollusks now and then, and some of these, of course, are important fur-bearers and important checks on the mouse population. Even frogs and snakes have been known to eat these animals, and one snake — the relatively common red-bellied snake — may feed largely on slugs such as attack a number of our garden plants.

In spite of the fact that man can find on land and in fresh waters mollusks that are edible we do not suggest a free experimentation in this realm. Too many of the waters may be too highly polluted to yield animals that may make safe food for us. Zoologists find that the bodies of our fresh-water mollusks serve as hosts for flukes, mites, worms and other creatures whose introduction into our bodies might probably best be avoided. Great concern is felt by health authorities lest the disease schistomiasis spread and become established in the




**Reproductive story in a fresh-water mussel**

United States. The causal organism lives in pond snails closely related to the wheel snail or disc pond-snail, which has wide distribution in our waters. Infected snails free small animals that attack man, affecting seriously, or even fatally, the blood, spleen, liver, bladder and large intestines of the unfortunate human. There is some indications that snails bearing the organisms that cause this disease do not thrive in waters high in lime content. For this reason the addition of lime to waters in which suspected snails may live has been suggested as a control measure.

One should not conclude from what has just been written that the role of pond snails in our waterways is wholly bad so far as our health is concerned. Most pond snails have powerful appetites. They may consume great quantities of water plants, thus permitting a great penetration of sunlight to the lower levels of the water. This sunlight in itself may serve to reduce the dangerous qualities of the water involved. Certainly in some cases snails serve a most valuable function in reducing plants on drinking water supply reservoirs, and if it is true that, to a slight degree, they may contribute to pollution it ill behooves man to criticize the snail on this point.

While it is possible that plastics may well supplant fresh-water mollusks as a source of material for buttons, nevertheless the shells of these animals still are important to the button industry. A relatively recent survey of 45 stations in Michigan shows that when, in 1948, the shells were selling at $40 a ton fishermen collected an average of 92 pounds an hour, which earned them a wage of $1.84 an hour. In favorable situations yields as high as 247 pounds an hour were reported. While it is true that these fresh-water mussels may yield valuable pearls, the percentage of animals yielding pearls is so small that it is hardly economical to consider pearl seeking in mussels as a stable occupation. As is so often true in most lines of business, the greatest return in the long run comes not from the rare, high-priced unit but from the abundant sources of supply.

At times it has been proposed that one might enter into the culture of fresh-water mollusks useful in the button industry. Unfortunately this is not practicable, largely because of the manner in which these animals establish themselves in a given area on a stream or pond bottom.

The life history of at least one of the more important fresh-water mussels has been suggested in the chart section of this insert. Typically the mussel may free from its gills into the water a swarm of little mussels. These, by opening and shutting their shells, move rather freely through the water. When one of these larval animals finds itself, by luck or otherwise, on some fish it may attach itself to the fish and live on the animal as a parasite for a while. One of the most interesting things about this is that the different kinds of mussels may show a high preference for special kinds of fish. If, then, a larval mussel finds itself on the wrong kind of fish it does not develop as it should and may drop off and die.

Also interesting is the fact that some of the most valuable producers of shells important as button sources live as parasites on such fishes as gar pike, which to many fisherman are considered despicable inhabitants of their favorite waterways. This is only one of many bits of information that show us how important it is that we reserve judgment on the value of almost any plant or animal with which we may share space on the globe. Efforts have been made by research biologists to develop some way whereby the (Continued on page 32)

**Slug, *Limax flavus*.**

**Slug, *Deroceras reticulatum*.**

**Slug, *Philomycus carolinianus*.**

**Slug, *Deroceras laeve*.**

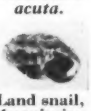
**Slug, *Arion circumscriptus*.**

**Pond snail, *Physella gyrina*.**

**Pond snail, *Lymnaea stagnalis*.**

**Pond snail, *Pleurocera acuta*.**

**Pond snail, *Campeloma decisum*.**



**Land snail, *Anguispira alternata*.**

| PHYLUM | MOLLUSCA | | | |
|---|---|---|---|---|
| CLASS | Pelecypoda. Animals without heads but with two shells. Any movement of adults from place to place is by thrusting of single foot from between shells and from between parts of the mantle. | | | |
| ORDER | Prionodesmacea. Interior of shells with mother-of-pearl but in some species like porcelain. See exception below. | | Teleodesmacea. Interior of shells like porcelain usually, never like mother-of-pearl. | |
| SUBORDER or further order characters. | Some members of the order do not have shells lined with mother-of-pearl pearl but these are fastened to supports by flexible fastenings. Most of the fresh-water clams and mussels are free to move about at all times as adults and belong to the family *Unionidae*. The order included such well-known salt-water animals as the mussels, scallops, oysters, jingle shells, ark shells or blood clams. Some forms may be found in fresh water, in brackish water and in salt water. | | As in the preceding order members of this order may be found in fresh water, brackish water or salt water. While some of the fresh-water forms in the preceding order may be attached to the bottom by means of a tough flexible thread (byssus) none of the fresh-water forms of this group possess that structure as adults. The order includes such well-known organisms as clams, cockles, angel-wings, ship-worms, razor clams, soft-shelled clams. While the sexes in members of the order are usually separate they are not in the species here considered. | |
| RELATIONS | For illustrations and descriptions of related marine forms see inserts 10 and 34 of this series in NATURE MAGAZINE. | | For illustrations and descriptions of related marine forms see inserts 10 and 34 of this series in NATURE MAGAZINE. | |
| FAMILY | Unionidae. Fresh-water pelecypods. In most members of this group eggs are carried in the gills of adult female. Eggs fertilized in late season may be freed following spring and may spend winter developing to free-swimming larvae that attach selves selectively to fish and develop as parasites on fish. In *Lampsilis*, described below, parasitic stage may last 3 weeks. Then animal assumes adult form, deserts fish and lives in mud. May require to 2 years to reach mature reproductive animal of 2-3 inch length from 1/100-inch animal that leaves the fish. Shells are valuable in making buttons and in chicken food and flesh may be used in chicken food. Essential role is that of scavenger and food for larger animals. | | Cyrenidae. Most of these fresh-water clams have shells that are thin, usually greenish and the animals bear proportionately long, flattened feet, one foot to an animal, of course. Eggs are borne in the inner pair of gills and develop there until free to make their own way. This omits parasitic stage characteristic of preceding family and order. Young clams freshly freed from parent may have a byssus by which they suspend themselves to a handy support but this is lacking in adults. Animals often thickly crowded on stream bottom the shells of dead animals making the bottom almost white. Food is strained from water passing over the gills much as is the case in the preceding order. | |
| GENERA | The many genera in the family include at least 1,000 species of which about one-half are found in United States. Possibly reach greatest abundance in slow, mud-bottomed rivers such as are found in the Mississippi system. | | While this is a relatively small family the genus *Sphaerium*, which may be common, may have over 70 species. Two of the genera, *Sphaerium* and *Pisidium*, here figured differ superficially in the shape of the shells as suggested below. | |
| SPECIES | *Lampsilis siliquoidea.* Mussel. Mucket. About 2″ by 4″. Shells nearly equal, with those of female more inflated to rear and generally shorter and heavier. Young may show greenish rays over yellowish cover. Old shells brown, smoothly polished. | *Anodonta grandis.* Shell to nearly 5″ long or, rarely, more. Color, green to black with rays that are usually faint. Eccentric growth rings and irregular wrinkles near hinged region. Shell rather plump. | *Sphaerium fallax.* The swellings at the hinge (umbo) are directed away from the foot or at the shell middle. Shell is about ½ inch across, is fragile, clean-looking and with a suggestion of being triangular. | *Pisidium compressum.* Shell is minute, an adult not ordinarily exceeding 1/5 inch at greatest diameter. Species is brown or yellow and may be found in suitable environments in almost any part of the United States. |
| OTHER RELATIVES | In *Lampsilis* outer shell covering is bright colored. In *Elliptio* outer shell covering is dull and the outer gills alone carry eggs. | *Strophitus rugosus.* See illustration. Yellowish with dark rays outside and distinctly bluish white on inside. | These animals on occasion enter into diet of fishes and other animals of the environment. | There are about 60 species of the genus of worldwide distribution. About 20 of these are to be found in America. |

| MOLLUSCA | | | | |
|---|---|---|---|---|
| Gastropods. Animals with a single, broad, flat foot, and usually a single, spirally coiled shell, with a distinct head bearing 1 or 2 pairs of tentacles. | | | | |
| Prosobranchiata. Shell opening usually closed. | Pulmonata. Easily characterized by presence of lungs and absence of gills. Both sexes in one animal. Shell opening not usually closed with an operculum. | | | |
| Animals usually have heavy shells, one pair of tentacles, one pair of eyes and some bear a long, useful proboscis. Fresh-water representatives of Viviparidae bear living young. | Suborder Basommatophora. Fresh-water Snails. Animals with a single pair of tentacles that are hollow and do not retract. Eyes at base not at tip of tentacles. Reproductive pores usually on right side with male near tentacle and female near breathing pore further to rear. Shells delicate while preceding order were substantial. In next suborder there is one reproductive pore and it bears both sex organs. Fresh-water snails lay jelly-covered eggs; land snails shell-covered eggs. At least a dozen families of fresh-water snails including over 4,000 species. Some "fresh-water" snails may be found in brackish or even in salt water. See next page for treatment of land snails in related suborder. | | | |
| See 10th and 34th insert for further help here. | We elect to present here representatives of 4 of the dozen families, each of which has a distinctive, easily recognized type of shell with variations that challenge the specialist. | | | |
| Viviparidae. Shells conical or globose. Whorls rounded. Eyes on short stalks beside stout tentacles. In many, operculum that closes opening and protects animal is horny and sometimes this has a concentric sculpturing. Young remain in parent shell awhile after hatching. Members of family are widely distributed over the world. | Ancylidae. Shells thin and appear as cones rather than as spirals. Tentacles triangular and bear eyes at bases. Animals remain more or less fixed, apparently. Shell opening oval. Three jaws each covered with fine structures that assist in getting food. Animals easily overlooked on bottom of streams in which they live. | Planorbidae. Shell coiled disc or with greatly flattened spire. In reproduction, there is reciprocal exchange between sexes of two individuals. Eggs jelly-covered, laid in masses on supports under water and in typical species and under good condition hatch in 2-3 weeks. Growth continues to 5 years and life history is slow. | Physidae. Shell opening to left when spire points upward. Large opening in shell oval. Reproduction reciprocal. Numerous eggs laid in clear jelly masses on supports under water, hatch in 2-3 weeks. Growth slow, maturity being reached in 2 to 3 years. May be active in winter in representative species. | Lymnaeidae. Shells usually thin long-spired, with opening to right when spire points upward. Shell often expanded around opening. Foot rounded and flat. No covering over shell opening. Spherical eggs laid in jelly masses under water on support. Hatching takes place in few weeks and development is slow. |
| There are a dozen genera and over 200 species to be found in fresh water. | In the genus *Ferrisia* represented in North America there are at least 16 species. | There are some 170 species in the family with species here considered common east of the Rockies. | Over 150 species of wide distribution with some 20 or more known in the United States. | Several hundred species in the family in fresh waters in all parts of world and half hundred found in United States. |
| *Campeloma decisum.* One of 6 North American species. Just over 1 inch long, with solid cone and spire as long as opening. Surface shines. Dark green outside. Blue inside. Common in eastern and central United States. | *Ferrisia rivularis*, a horny, cone-shaped shell whose tip leans towards one side and is blunt. Length about 1/5 inch. Shell white on inside. River Limpet. Common in streams and ponds clinging to bottom. | *Helisoma trivolvis.* Wheel Snail. Disc Pond Snail. Shell yellow to brown, composed of 4 whorls. Opening large, with v-shaped angle above, to 1 inch wide and to 2/5 inch high. | *Physella heterostropha.* Left-handed Pond Snail. Tadpole Snail. Bladder Snail. Genus formerly known as *Physa.* Shell to ½ inch long and to 1/3 inch through usually with 4 unequal whorls, yellow to black. Reproductive notes above apply to this species. | *Stagnicola palustris.* Right-handed Pond Snail. Great Pond Snail. Shell to 1-1/5 inches long and ½ inch through. Color varies with lime content of water. Less active than members of Physidae usually. |
| Related *Viviparus* has thin shell of some 5 whorls. Over 100 species of worldwide distribution. | *Ferrisia parallelus.* Blunt ends, twice as long as wide, dark green. Parallel sides give name. | Some related species and genera may serve as host for organisms causing schistomiasis, but this species does not so function. | May be host to trematode worm (*Distomum atriventre*) that parasitizes frogs and toads. Serves as general scavenger of waterways. | May serve as intermediate host for some parasites such as *Distomum retusum* but major role is that of scavenger and fish food. |

| PHYLUM | MOLLUSCA | | |
|---|---|---|---|
| CLASS | Gastropoda. See preceding page. | | |
| ORDER | Pulmonata. Fresh-water and Land Snails. See previous chart. About 19,000 species. Members of the order possess lungs and lack gills. | | |
| SUBORDER | Stylommatophora. The Land Snails. Land Snails differ most conspicuously from the water snails by their land habit and in the fact that they bear two pairs of tentacles all of which may be withdrawn into the body of the animal. The larger or longer pair is to the rear of the shorter pair and each tentacle bears at its tip an eye. Group includes about 15,000 known species of land snails belonging to some 20 families. Here we consider members of three families that lack a shell or conceal it, the Limacidae, the Arionidae and the Philomycidae and on the next page the families in which the snails possess external shells that are not hidden by the soft animal but may rather at times conceal the soft parts wholly or in part. Our snails are both native and introduced and the native species vary considerably in different regions. See next page. | | |
| GROUPS | The Slugs. These animals lack or conceal their shells. Two of the families considered are represented by American species while the third contains species to be found in the Old World and in the New World. | | |
| FAMILY | Arionidae. Members of this family show no external shell but a small shield-like structure (mantle) that appears forward on the back, contains a small, hidden, flat shell at its rear or numerous granules of lime. Breathing pore is at right margin of mantle in front of middle area. Foot has marginal furrows which are not to be found in members of Limacidae (next column). | Limacidae. There is no external shell but a small thin plate in the mantle. Mantle does not extend beyond the middle of body to the rear. Large breathing pore opens near rear right margin of mantle. Foot lacks marginal furrows. *Deroceras reticulatum* a typical slug has both sexes represented in an individual, reciprocal mating, lays 500-800 eggs per slug, each 1/8-1/16 inch long, white, laid at roots in bunches of to 50, hatch in 3 weeks to over winter with wintering slugs laying eggs that develop mature slugs by first October. Largely nocturnal, detecting food by scent. Can suspend selves by mucus threads from supports. May secrete great quantities of mucus and leave slime trails on sidewalks abundantly. | Philomycidae. Mantle covers length of body or at least ¾ length. Breathing pore is on right side to front of mantle. Eyes borne on balls at end of longer tentacles. No mucus pore to the rear. Short tentacles are immediately below the eye-bearing tentacles which themselves are very short. |
| GENERA | There are 6 genera in the family and some 15 American species. We consider here two genera, *Arion* and *Ariolimax*. | There are 20 genera and several hundred species in the family of which 6 genera are American. Two genera here considered are *Deroceras* and *Limax*. | There are 2 genera, *Philomycus* and *Pallifera* here considered. These include at least 5 American species. |
| SPECIES | *Arion* is an Old World genus of some 25 species. Back is not keeled but bears rows of elongate tubercles. *A. conscriptus* is 1½ inches long, is shown in illustration and is often common in gardens usually under loose stones. *A. hortensis* is to 2 inches long, gray, yellow or black. | *Deroceras reticulatum* (*agrestes*) is 1 to 2 inches long, rather stout, with pale brown or yellow body with pale gray border around pore, black eyes, with dark line behind each to mantle. Rests as creamy ball under grass on damp ground but extends body and head readily when taken into hand. An Old World species. | *Limax maximus* is to 6 inches long when extended, with keeled back ashy gray to light brown, with black or brown stripes or blotches, with foot dirty white. Mantle large, oval, with breathing pore to rear on right side. Tentacles short and blunt. Eyes on swellings on tentacle tips. Relatively common. | *Philomycus carolinianus*. To 4 inches long, with flattened body rounded to rear, with white or yellow back with irregular brown or black spots. Characteristically gives off very sticky mucus when handled. Found in forested areas often with many individuals near each other. Foot is whitish. Mantle covers practically whole body. |
| OTHER SPECIES | *Ariolimax columbianus*, to 6 inches long, often blotched with black. Found in damp forests of the Northwest. | *Deroceras laeve*, a native species is under 1 inch long, bluish to brownish, slender, with black eyes on ends of slender tentacles. | *Limax flavus* to 4 inches long, narrower than *L. maximus*, with long slender tentacles bearing eyes, yellow brown, with bluish head and narrow yellow foot. | *Pallifera dorsalis* is under 1 inch long. Mantle covers rear ¾ of body instead of whole body as in *Philomycus* or front part of body as in *Deroceras*. |

## MOLLUSCA

Gastropoda. See preceding pages.

Pulmonata. See preceding pages.

Stylommatophora. The Land Snails. On the preceding page we gave the general characters of this suborder together with a treatment of representatives of three families of slugs. In wet seasons slugs may be serious pests in gardens. Fine ashes about plants cause them to secrete mucus even to death or they may be poisoned by stale beer or Paris green. On this page we consider five families of land snails out of at least twenty which include some 15,000 species. An excellent though restricted reference on land snails is "Fieldbook of Land Snails" published by Illinois Natural History Survey. Some land snails are carnivorous but most are scavengers or plant eaters. Some carry flukes and other parasites dangerous to man but have a limited distribution. The nature of the shell may vary with the amount of lime available. Most serve as food for some birds and mammals such as shrews and some mice.

The Land Snails here considered include the Polygyrideae of some 30 genera and some thousands of species, the Endodontidae with 4 American genera, the Haplotrematidae with 12 American species all but one from the West Coast, and the Zonitidae of 65 American species and the Succinidae of 6 genera.

| Polygyridae. Shell with lip swollen and reflected at edge. Body capable of being completely withdrawn into shell, granule-covered and 2 times as long as shell diameter. Shell has 5 to 7 whorls. Opening has or lacks teeth. Foot lacks marginal grooves. Young and immature lack recurved lip of shell characteristic of adults. Shell diameters in family vary from ½ to 1½ inch. | Endodontidae Lip of shell not reflected or swollen as in Polygyridae. Shell dull, opaque, brown, in some cases there being streaks that are vertical or bands or sometimes uniform coloration. Eye-bearing tentacles are long and slender and other pair short and inconspicuous. Shell-size varies in species from 1/16 to over 1 inch in diameter. Sculpture usually like ribs across whorls. | Haplotrematidae. Lip of shell not reflected as in Polygyridae. Shell polished and smooth as in Zonitidae but unlike Endodontidae. Spire flattened rather than rounded as in Zonitidae. Shell has 5 whorls when mature, a relatively large opening and is carried well to the rear of the extended animal and shows reddish-orange mantle cover at edge. Body gray forward and orange to the rear. | Zonitidae. Lip of shell not reflected as in Polygyridae. Shell with a smooth surface unlike Endodontidae which is dull. Spire is rounded unlike the practically flattened spire of Haplotrematidae. Color varies but surface sculpture is fine. Shell may cover animal completely though extended animal is twice as long as shell is wide. Shells vary from 1/16 to 1 inch diameter. | Succinidae. Amber Snails. Shells thin, with small spire, large opening, higher than broad, without recurved or thickened opening margin. Opening occupies at least ½ length of shell. Animal cannot be contained within the shell and is blunt forward and tapering to the rear. Body is yellow to black, mottled or streaked and varying in season being darker in spring or even after a rain. Leaves strong slime trail in its train. |
|---|---|---|---|---|
| Of over 30 genera we elect to consider two, *Triodopsis* sometimes included in *Polygyra* and *Helix*. | Of 4 American genera we consider two, *Anguispira* and *Helicodiscus*. Other genera include *Discus* and *Punctum*. | Of a dozen American species all but one are limited to Pacific Coast areas. Family is essentially American. | Over 100 American species in this family that has world wide representation. | Of some 200 species about 25 are to be found in North America. Related family Bulimulidae has brown marked surface and more southern range. |
| *Triodopsis albolabris.* White-lipped Land Snail. Shell 1½ inch of 1½ low whorls with lip much whiter than brown shell. Small spherical eggs laid in moist places in May may hatch in 20 to 30 days and develop into mature individuals in 2 years. Avoids sun. | *Anguispira alternata.* Striped Wood Snail. Shell about 4/5 inch in diameter, conspicuous because of irregular dashes of brown on light yellow background. Found in wet or dry places under bark sometimes up to 15 feet above ground in standing timber. Banded Snail. | *Haplotrema concavum.* Shell about ¾ inch in diameter, whitish when mature but greenish when young or almost transparent. Most common as solitary individuals on ground of hardwood forest. Carnivorous and has thorn-like teeth on tongue. Tiger Snail. | *Ventridens ligera.* Shell diameter to about ½ inch with height about ¾ the diameter, either with teeth at shell opening or lime deposits inside shell. Shell yellow, horn-colored. Body black or slate-colored above and paler to rear and beneath. | *Succinea ovalis.* Marsh Snail. Amber Snail. Shell about ⅜ inch long, pale yellowish olive, with opening to right resembling a sugar scoop. Found in wet spots on plants, near but not commonly in water, under sticks, stones and logs or on plant stems above ground. Eggs laid where sun cannot reach them. |
| *Helix aspersa.* Edible European Spotted Snail. Shell 1½ inch, brownish yellow with irregular spots. Roasted in shell and eaten from it. | *Helicodiscus parallelus.* About 1/8 inch in diameter, with very low spire of 4 whorls, with parallel ridges following direction of whorls. | *Haplotrema vancouverense.* Western. Yellow with a shell diameter of about 1-1/5 inches. | In this family the eye-bearing tentacles are remarkably longer than the other pair. | *Bulimulus dealbatus* in related family is about 1 inch long, white and often found in great concentrations on the ground. |

(Continued from page 27) mussels could be raised without the necessity of going through the stage as a fish parasite. If this could be done, a farmer controlling a mud-bottomed slough might conceivably plant in it a crop of mussels much as he now plants his corn and potatoes. When this planting must be left to the vagaries of the wanderings of some fish the technique smacks of the haphazard. As such it will not ordinarily be considered as either practicable or popular.

One should not assume from what was just written that all two-shelled mollusks found in fresh waters depend on fish to move them far from their parents while they live on the fish as parasites. As the chart section will show, some produce young by nursing them in their own gills, freeing the young clams when they are proportionately larger than their parasitic relatives. Naturally, when this takes place, the number of young produced is smaller than is the case with the fish-parasitic group. Few of these fresh-water clams attain any considerable size, and none could be used as a basis for button making. Since they are not widely distributed when they leave the parent, they often find themselves living closely with their relatives. Sometimes this means that the bottom of the stream where these animals may be found may be thickly crowded with shells of the living and of the dead animals. Some of these small clams may enter into the diet of some fishes, but on the whole they probably play an insignificant part in the economy of their environment. This does not mean that they lack interest for the inquisitive biologist, however.

We have in the illustrations here two sketches showing the important external features of pond snails and of land snails. The land snails, of course, include the slugs, whose shells may be absent, rudimentary or only slightly developed. We cannot here consider extensively the many kinds of mollusks you may find in your neighborhood, although we do show you pictures of representatives of a few important groups.

Fundamentally the land snails and pond snails necessarily differ from each other in their respiratory apparatus. The animal that lives on land naturally must breathe air and it therefore has lungs. The animal that lives in water may, by the same token, be expected to use lungs. They do not challenge this simple logic. But the possession of lungs and of gills may not be recognized easily by a superficial examination of the animal. What you can observe easily is that the land snails have two pairs of tentacles, while the water snails have but a single pair. One pair of the tentacles borne by the land snails holds the eyes at the tips. Since these tentacles may be raised or lowered, the eyes, too, may be raised or lowered, making it unnecessary for the animal to rear any other part of the body to extend its range of vision.

Since the pond snails lack one pair of tentacles it is not surprising to find that, in these animals, the eye is borne at or near the base of the tentacles. One might assume with some safety that sight may not be so important to a snail as may be some other senses, and it is quite probable that the set of tentacles to be found in both the pond snails and the land snails may be sensitive to stimuli other than light. It is also quite probable that sensitivity to these other stimuli is what is really important to the snails.

An examination of the sketches here, or of some land or pond snail, will show that the breathing pore in each is relatively close to the shell. In the same region, close to the edge of the shell, may be found a "mantle collar" that produces the material that adds to the size of the shell. You probably will best learn about the feet of snails by direct observation. Since the animals may crawl freely on glass in air or underwater, you can usually look through the glass and get some idea of what is going on. Not a few of the snails may lay great importance on mucus that they secrete. This may make a trail and provides a suitable medium in which the muscles of the single foot may be put into play. In the land snails this mucus may be used to suspend the animals from trees. In pond snails it may be used to suspend the animal from water plants, or even, at times, from a float of mucus that is left at the surface of the water. If you have never watched the movements of the muscles of a snail through glass I have no desire to spoil your pleasure by attempting inadequately to describe it.

Some of our snails possess a conspicuous structure with which they plug the opening in their shell when they withdraw to its protection. This "operculum" is most conspicuous in some of the snails that closely resemble the periwinkles that cover rocks at the tide lines on our sea coasts. Interestingly enough, many of these reproduce not by laying eggs but by giving birth to living young that have developed in the parent to such a point that they can maintain their independence as soon as they leave the parent. Among the snails that lay eggs there is, as one might expect, a relatively common difference between the land snails and the pond snails. Since the eggs of the pond snails will be surrounded by water there is no need for a shell that will prevent them from drying up. Usually the eggs of these pond snails are surrounded by a mass of jelly, one purpose of which may be to protect the young snails from attack by some of their enemies. The land snails needing to have their eggs protected from the dry air may well have shells that help them provide this safety.

In this story of land snails and other mollusks we have not touched on the fun that can be derived from the collection of the creatures. Some of the tree snails of the warmer regions are truly things of beauty, and there are those who find even greater satisfaction in collecting shells from trees than in the collecting of the beachcomber branch of the guild. So you may see, whether your interest is in wildlife, in farming, in health, in industry, in food, or in fun, these animals have something worth while to offer. Here is hoping that you do not pass up the opportunity to know them better. It is quite probable that sometime we will have another insert dealing with this group, and when that time comes we may well emphasize the tree snails.

# Water and National Parks

Soon after the first of the new year the President's Water Resources Policy Commission will make its report, and, presumably, recommend a water policy for the United States. In arriving at its conclusions, this Commission will have taken testimony and considered a tremendous volume of material submitted in briefs, comments, proposals and recommendations from innumerable organizations, agencies and individuals concerned, in one way or another, with water resources. Conservation groups, and governmental agencies administering natural resources, including water, are among those that have presented their viewpoints.

It may safely be assumed that the forthcoming report will be an important document. It should contain a vast amount of valuable and interesting information about our water resources and the condition in which they are today. Since the Commission is expressly charged with recommending a water policy, but is also specifically instructed not to concern itself with the administrative application of such a policy, it is reasonable to assume that its task will have been only partly accomplished. A water resources policy is certainly no use unless it is put into effect, and the manner of its administration would appear to be almost as important as the program itself.

Nevertheless, the report will be awaited with great interest, especially so, perhaps, by conservationists. Water, to the conservationist, means more than acre feet, kilowatt hours and other terms by which the engineer, reclamationist, power developer, irrigationist or other user measures water's value. Indeed, the conservationist has perhaps the keenest appreciation of water in our economy and prosperity because he knows best all the factors that go to maintain water tables and control of water as Nature intended. He also has a deep understanding of the importance of water recreationally, and feels strongly the value of water as a component part of those areas set aside for preservation under the administration of the National Park Service.

We shall, therefore, be particularly concerned with what the Commission has to say about water within these reservations. We shall look especially to discover whether there is a decision to consider water resources without distinction as to where they may be, and without recognition of special values upon which no price tag should be placed or to which no economic yardstick should be applied.

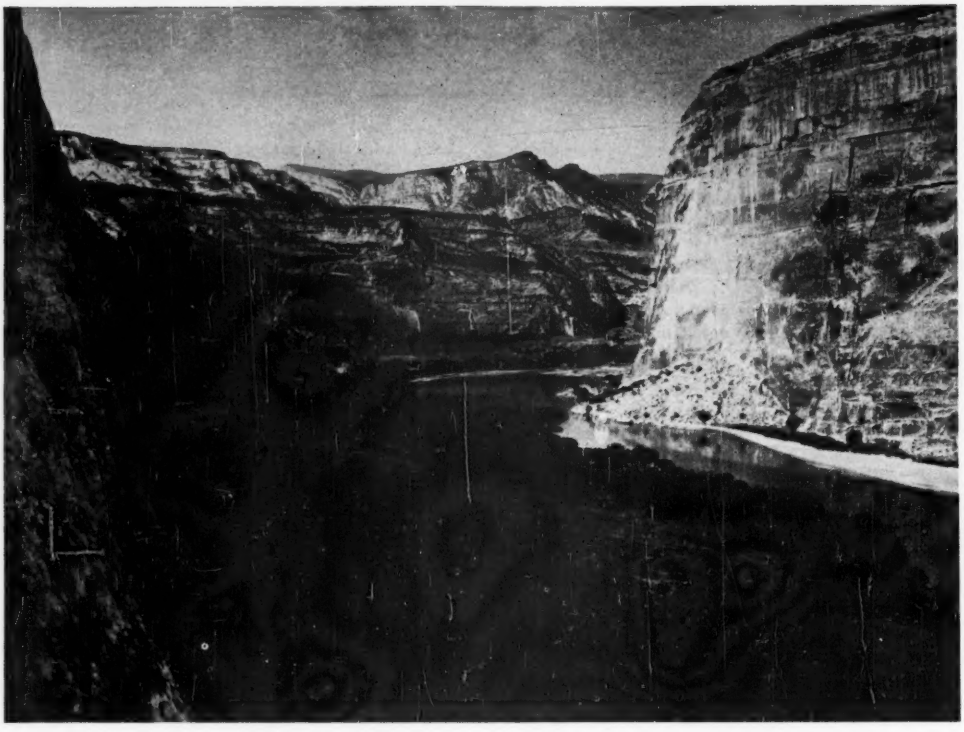
We are referring, of course, to those areas assigned to the National Park Service as trustees for all the people — today and tomorrow. This agency of the Department of the Interior, in filing a statement with the Commission, pointed out that "the Congress has repeatedly made plain its intention that the national parks, national monuments and other areas constituting the National Park System are to be held free of any use which would modify or destroy the natural conditions, scenic beauty, historic or prehistoric objects, or wildlife, for the enjoyment of which these areas were given their special status. Differing in character, purpose and management from any other Federal holdings, they cannot, in the usual sense of the term, be 'integrated' into plans in which a basic purpose is the direct economic utilization of natural resources."

In 1916 the Act of Congress authorizing the establishment of the National Park Service specified the task of the Service as "to conserve the scenery, the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." Through the years there have been frequent attempts to break down this mandate; to exploit the natural resources of these reservations. There are still such attempts today, against which the people must be ever vigilant and in opposition to which conservationists must be ever alert.

Through the years, however, the policy with respect to National Park Service areas has been reaffirmed and strengthened. The Federal Water Power Act of 1920, as amended in 1921, protects national parks and monuments against use for power projects. The Act was further amended in 1935 to extend similar protection to all such areas as might thereafter be established.

In its statement to the President's Commission, the National Park Service "makes a plea for proper balance between the economic (that on which we rely to make a living) and the cultural (that which enables us to live fully) in the utilization of our natural resources. It would be folly to set aside such large quantities of our land and water for recreation that the ability of the people of the country to make a decent livelihood is curtailed; it would similarly be folly to develop our resources for economic use beyond genuine need and to the detriment of our opportunities to enjoy our fair share of mental and spiritual satisfactions — those experiences which lift us above the beasts of the field. All this the Congress and the people of the United States have had in mind in supporting the institution of the national parks."

And, we are certain, the members of the President's Water Resources Policy Commission will equally have this in mind. If, by some mischance, the established policy with respect to these areas is impaired, directly or by implication, then the conservationists of this country, and the people, who own these parks and hope to pass them on to coming generations, unimpaired, will have another fight on their hands.



**Early morning sunshine illuminates the 800-foot wall of Steamboat Rock, while the floor of Pat's Hole remains in shadow. The proposed Echo Park dam would be located five miles down-river, on the other side of the Rock, and would put Pat's Hole under 500 feet of water.**

# Dinosaur National Monument

*By* HARVEY BROOME

*Photographs by Devereux Butcher*

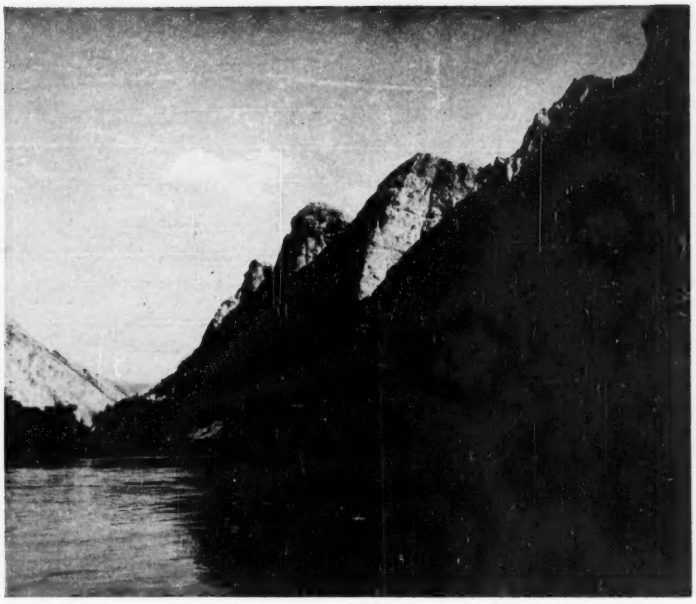
IN RETROSPECT, it is difficult to say just what I expected to see when I visited Dinosaur National Monument. I know that I expected rough, hot country. I expected canyons. But my thought was detached; like the impression one gets of terrain from an airplane. That is why I wanted to see the Monument. Jim Thompson once said: "One photograph is worth a thousand words." And one view must be worth a thousand photographs.

Seven of us had driven over to Jensen, Utah, from the 1950 Annual Meeting of the Council of The Wilderness Society at Buford, Colorado. The Bureau of Reclamation had just received approval by Secretary of the Interior Oscar Chapman for the erection of two dams on the Green River within the boundaries of the Dinosaur National Monument. This approval had been given over the protests of officials of the National Park Service, which administers this Monument. The way had been cleared for these dams by the action of the Secretary, and we knew that only the failure of Congress to appropriate money for the purpose could block their construction. We wanted to see for ourselves the damage that would be done to the canyons by the water from these dams.

Our party included Olaus Murie, newly elected president of The Wilderness Society, and his wife, "Mardy"; Ernest Griffith, treasurer of the Society; Dick Leonard, a member of its Council and secretary of the Sierra Club; Ned Graves, a California member of the Society; my wife, Anne, and myself.

At Jensen, we were met by Dave Canfield, Superintendent of Rocky Mountain National Park and Supervisor of the Monument, and by his wife, Helen. They accompanied us to Monument Headquarters, about six miles away.

The day was hot. My cheeks and nose and ears, and



**Afternoon shadows fill Split Mountain Canyon. Taken at the last bend of the Green River, inside Dinosaur National Monument, this view looks southeast toward the canyon's mouth, where the river leaves the monument to flow for 200 miles across Utah to its junction with the Colorado River. The proposed Split Mountain dam would be located at this bend, perhaps a few hundred feet farther up-river to the left.**

the tip of my chin were smarting from sunburn incurred back in the Flat Tops country — and as we set off through that dry, seared country toward the Headquarters I knew I was in for more burning, and something new in the way of experiences. The drive through the deserts of southeastern Utah two years before had not been like this. There was something inescapable, almost malevolent, in the dry, blasting heat and brightness. At Headquarters we met the Superintendent, Jess Lombard, and took the scorching path 200 yards or so up to the quarry where the strata had yielded up so many dinosaur remains. There were a few clumps of sagebrush — no trees — a sandy path — bleak mountains all around. The only relief was a number of bright blooming flowers.

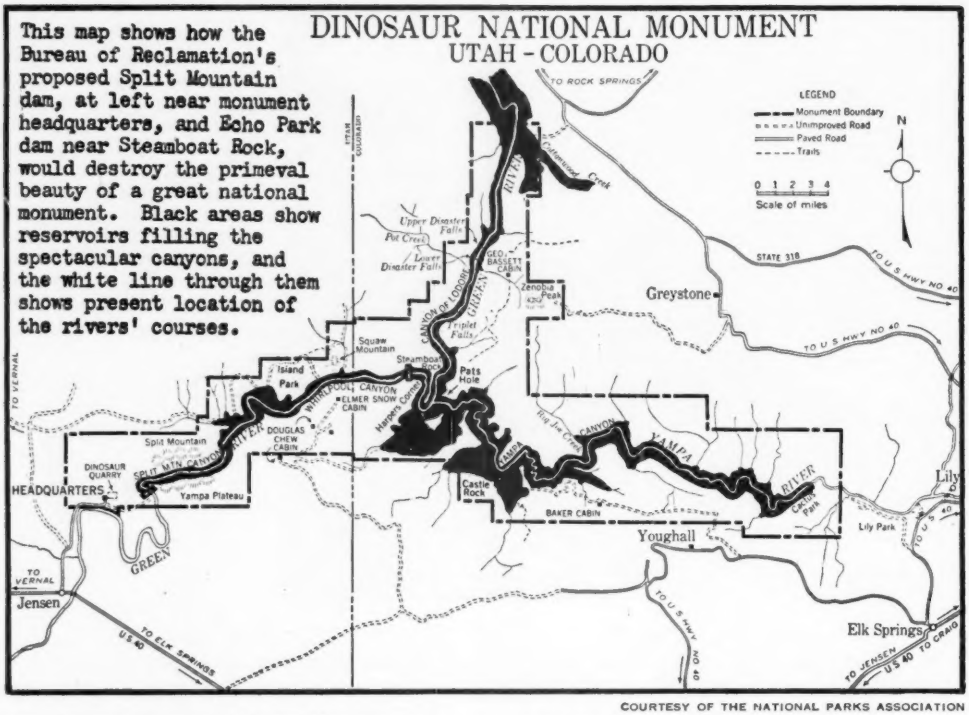
The surface of the dinosaur-yielding strata lay on a slant. In years past several perfect skeletons had been removed — but the exposed remains that were visible to us were only fragmentary — a knee joint, a vertebra. The hope is that Congress will appropriate money for further exploration and that a perfect specimen will be uncovered, and then will be left in place as an example of how the remains are found. I was interested in a discussion between Jess Lombard and Dick Leonard to the effect that this same stratification outcrops in other States, and that wherever it does some dinosaur remains are found.

The quarry was interesting to me, of course, but what interested me more was that the original Monument of but eighty acres had been expanded to more than 200,000 acres to include canyons of the Green and Yampa Rivers. These I was most anxious to see.

Our first good glimpse of the Green was later in the afternoon at a point about a half-mile below the site of the proposed Split Mountain Dam where the stream emerged from a canyon. Here there was shade, and there were ripples in the water. The air, which had seemed to me to be drawing the very moisture from my body, again seemed friendly and temperate. Like a sponge, my body seemed to soak up moisture from the air.

That night it rained. Dave voiced some concern about taking those old roads to Blue Mountain, where we would camp one night and from the top of which we could reach Round Top and Harpers Corner for views down into the canyons, and from which we could take a side canyon down to river level at the junction of the two rivers at Echo Park. But although the sky was overcast that morning, there was no more rain and nothing more was said.

We drove through sagebrush country, which I had seen before, but for which during the next two days I was to gain a wholesome respect bordering on affection. Blue Mountain was plateau-like — a rolling blue-green sea of sagebrush. On the ascent we went through sparse forests of juniper and of pinyon pine. By midmorning we had attained an elevation of about 7700 feet, or approximately 3000 feet higher than the valley at Jensen. In this sagebrush, mountaintop waste we came to a fork in the road and we took the right one for the trip to Round Top. It was road in name only. There was no rock or hard surface and little attempt at grading; simply a passageway of loose, dusty soil that had been opened through the brush. There is little




COURTESY OF THE NATIONAL PARKS ASSOCIATION

"development" in areas within the Monument as yet.

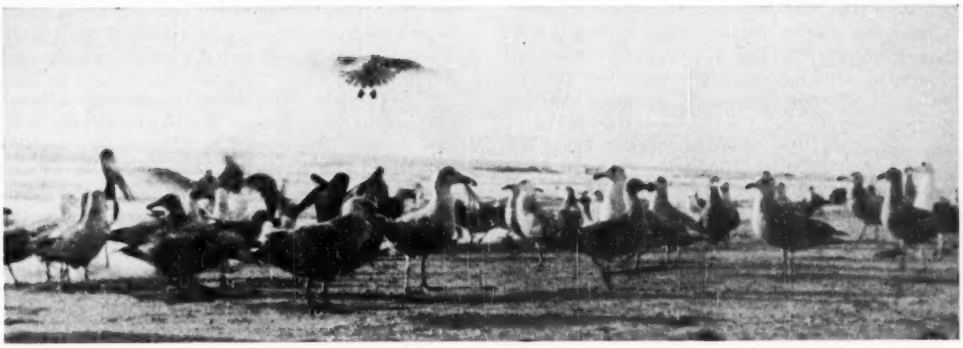
The sky was still heavy with clouds when we emerged on rocky, treeless Round Top. The gorge was filled with mist (much like Linville Gorge back in North Carolina). I was expecting nothing like this in desert country. But the fog did roll away eventually — and very dramatically. We looked down into a maze of rugged country — great thick slabs of strata emerging from under Blue Mountain at a slight tilt and rising gradually to an abrupt edge which marked the canyons proper. But the canyons were so contorted that, looking across at them and not directly down upon them, it was long before we made sense of what lay before us. Finally Dick and I picked out a promontory on the same level as Round Top, which we took to be Harpers Corner. Then from the map we could see that it overlooked the Green River just below the junction with the Yampa. Then we located Steamboat Rock far beneath Harpers Corner, and these two landmarks supplied the key to the maze. But even so I did not detect the tiny side canyons that split the great bordering plateau slabs, and down which we went later in the day to river level at Echo Park.

There was rich color in what we saw — a blueness in the distance that I had not thought to see. It was a hue rivalling the blue of eastern mountains, but with more purple in it. It may be that the blueness is not characteristic, that it was caused by the unusual moisture in the air, but it was lovely and appealing. Closer at hand were wilder, more violent colors — red, and yellow, and light, sandy browns.

In the afternoon we dropped off the side of Blue Mountain to the tilted plateau. It had not rained here; dust was inches deep on the road and swirled up and about us. Then down one of those hidden canyons, we entered a weird, exciting world of rock — great battlements, gendarmes, niches, and tempting slopes of hard, clean stone. One could spend days in there, just climbing, and trying to climb.

We stopped in a little oasis deep in the rock and passed through a screen of willows to the canyon wall. There, thirty feet above us on unweathered vertical stone, we saw pictographs of nice balance and proportions, outlined in the rock by a series of tiny depressions. From waving, antenna-like stippling, we guessed that they represented insects, and I thought of the Chapultepec of the Aztecs. How old were they? How had the artists mounted to that height and supported themselves for their lengthy task? Had they designedly located them where they would not weather? Were they done by old men or young men? What was stirring their minds? Were they crude ventures in art, or were they stories in stone? What is stirring the minds of those who would blandly hide these exquisite delineations behind mountains of water?

Dave stopped again. He (Continued on Page 52)



**San Clemente is a favorite haunt of sea birds, including California and Western gulls, great brown pelicans, and various shore birds.**

# Ravens—and Other Good Neighbors

*By* NELL MURBARGER

San Clemente Island, lying sixty-five miles west of San Diego, possesses more than 30,000 acres of as rough terrain as one might find this side of the moon. It boasts surf-lashed, rock-girt shores, chasms whose walls rise sheer for a thousand feet, volcanic fissures, shifting sand dunes, innumerable caverns, wind-swept and cactus-covered plateaus.

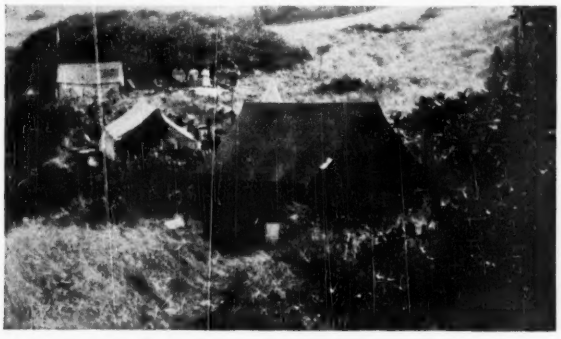
Only a government engineer could have visualized these acres as a potential Naval base, but shortly before the outbreak of World War II, the island was taken over by the Navy for that purpose. At that time there were not quite a dozen persons residing on the Island. I was one of them.

Living in a state of isolation approximating that of Robinson Crusoe, with less than one inhabitant to each 2500 acres, it is only natural that one will instinctively form an intimate friendship with every creature that walks, flies, or crawls. Thus it was on Clemente. I came to feel a genuine kindredship for even that creature of reputed evil portent, the raven.

While there were many larger and fiercer birds on the island, such as bald eagles and American ospreys, the ravens were the absolute monarchs. They gave no quarter and asked none; accepted no apologies and never retreated.

Many times, with binoculars, I have watched eagles, in desperate flight, pursued by a pair of ravens, or even a single raven. With a viciousness beyond human understanding, these black avengers would dart down on the larger bird's back, flailing his body with their wings, striking with taloned claws and slashing beaks. They would harry the eagle until it was thoroughly weary. Then, one of the ravens — if a pair had been pursuing their adversary — would return to the nest. The other, flying effortlessly behind the frantically plunging eagle, would chase it several miles, instantly pouncing upon it at any sign of reduced speed. Its victory won, the raven would return jubilantly to its mate, cawing with braggadocio and cavorting in the air.

There were numerous ravens' nests secreted in the unscalable cliffs back of our little cabin. Our tiger cat, Mike, was thoroughly at home on the island, and, as a general rule, was master of all he surveyed. On one occasion, however, he became over-zealous and attempted to investigate one of the more accessible nests. Creeping along a ledge that only a cat could negotiate, he was closely nearing the raven's stronghold when they discovered him in the act, and im-



**The author's camp on one visit to San Clemente Island — this particular stay being of six weeks duration. The shrubbery around camp abounded in Costa hummingbirds, warblers, vireos and other small song birds.**

mediately registered their protest in loud profanity.

Screaming in anger, the birds began darting at Mike from either side. The poor cat had no idea which way to turn and, after running on the ledge in one direction until stopped by the ferocious birds, would whirl and retrace his steps. No gun was permitted on the Island, but by throwing rocks and sticks we finally succeeded in frightening away the birds. Soon afterward we welcomed home a thoroughly chagrined tom cat; a cat who had lost not only several chunks of hair, but years of self confidence. Thereafter, Mike displayed much greater respect for ravens and their idiosyncrasies.

No aviator will ever master the art of flying as has the raven. He cannot soar as well as the eagle or turkey vulture, but he can perform flip-flops and victory rolls that would make a stunt-flyer turn green with envy. Often we abandoned all our pursuits to watch them clowning.

Folding wings tightly to their sides, they would dive from great heights like black comets. Again, they would turn over completely in the air, executing both backward and forward somersaults. Frequently, in breathless suspense, we watched them plummeting through the air as though lifeless — a tumbling, twisting, apparently uncontrolled mass of feathers. Within breathtaking distance of the rocky ground they would right themselves and zoom upward, gaining altitude with unbelievable speed, only to halt suddenly and remain suspended in midair, as motionless as though their sleek bodies were painted against the sky.

They were exceptionally tame, probably not so much from friendliness as from an overdeveloped curiosity. Whenever we went walking, particularly on the island's plateau, it was only a matter of minutes before one or a dozen ravens were flying within a stone's throw, cawing hoarsely and constantly, and always ready to stop when we stopped. They never seemed to tire of the vigil, and only nightfall caused them to desist.

Frequently a lone bird would follow one of us for an hour at a time, stalking along behind with all the dignity of Death itself. Rarely taking wing, the creature would approach within a dozen feet, all the while "commenting" in a low, sing-song monotone, the talk so nearly resembling human words as to sound positively uncanny. I would find myself listening, trying to interpret the queer jargon, even talking to the sombre fellow, who would only turn his head to one side and stare insolently.

We grew to know the ravens' habits, their different calls and types of flying. We could tell when they were "going somewhere," or just cruising around; whether they were circling over a crippled animal, waiting impatiently for the end, or hovering delightedly over carrion. Many a man has been found in the nick of time by their unintended aid; many another located too late.

In prehistoric times the natives of Santa Catalina Island, twenty miles distant, worshipped the raven and built a great temple in his honor, believing the devil or his counterpart spoke to them through these birds. It is highly probable that the ancient Clementeans — such near neighbors of the Catalinians — likewise reverenced this sable satanic ruler.

I have no quarrel with the ravens, birds of ill-omen though they may be, and outlaws they certainly are. They were once my good neighbors in a part of the world where neighbors were few.

Clemente's bird life was most diverse in size, ranging from the bald eagle, with a wing spread of seven or eight feet, to the Costa hummingbird, scarcely larger than one's thumb.

**Thousands of great brown pelicans frequent the rookery at Pelican Point, off the southwest tip of the Island. At times the huge rock seems to be a solid moving mass of sea birds.**

To one whose previous experience with bald eagles was limited to the hostile-looking creature on the reverse side of a dollar bill and to other versions of the national emblem, it was quite a thrill to see them circling "in person" over the island. Although I came to know them quite well, our acquaintanceship was not marked by any feeling of intimacy. In fact, with the bald eagle, I always felt a certain degree of inferiority, as though in the presence of an autocrat who only tolerated my being on earth because he was too preoccupied to take note of it.

Being on the island strictly for the purpose of studying its plant life, did not, however, prevent me from harboring an interest in eagles' nests. There were at least three active nests on Clemente. All of these, I was told, had been utilized for many years; longer, in fact, than anyone dwelling on the island could remember.

**At Seal Harbor thunderous seas pound endlessly at the base of a sheer cliff, which rises to the height of a 20-story building. Every fissure in this cliff held nests of the Brandt cormorant.**

High on the side of China Canyon, on the west slope of the island, an enormous eagle's nest was fastened to a sliver of rock that jutted from the main canyon wall like a chimney. By risking life and limb, one might have reached the nest by scrambling down a deep trough from the rim of the canyon. Below the nest, however, the overhanging wall fell away sheer for 200 feet — a dizzy depth if viewed from the insecurity of a century-old eagle's nest. The other members of my family assured me, vehemently, that visiting the nest was not feasible.

By using binoculars from the canyon's rim, it was possible to see that the nest was composed of sticks, choya cactus stems, goat bones, sea gull skeletons and fish vertebrae. Part of the lot was worked into the structure of the nest, while the remainder spilled over the sides — evidently table refuse that had been collecting for years.

Another nest was located in a canyon near the island's summit. Even before we knew of its existence, the huge mother eagle began circling over us, fretting and fussing. As in the old game of childhood, her actions served to inform us when we were "hot" or "cold," and, thus guided, we eventually found her treasure, located halfway up the sheer side of a rock-walled gorge.

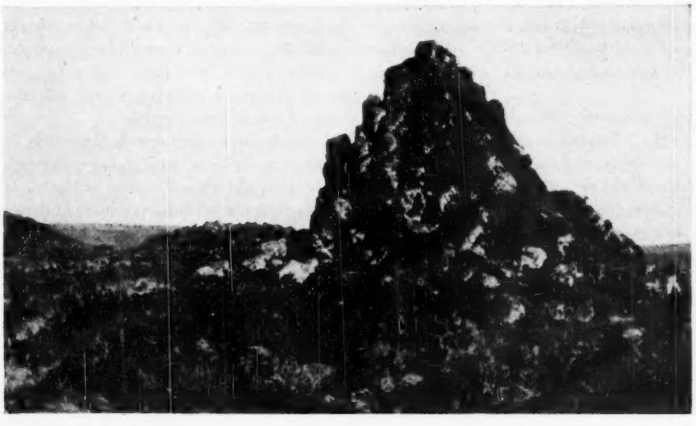
Arming ourselves with long sticks to frighten off the belligerent birds, we attempted to get close enough to photograph the nest. By the time we were within a hundred feet of it, both parents were circling wildly over us, halting their screaming and shrieking only to dive suddenly earthward with whistling wings. It is terrifying to be perched precariously on a narrow ledge of rock-walled canyon and to be dived at by a great bald eagle, murder written across his glowering features and screams of vengeance issuing from his throat.

We would wave the sticks frantically over our heads, but the thoroughly aroused birds would approach so close that we could see their stiff, spurred, outstretched talons and even the open wedge spaces between spread wing feathers. Then they would suddenly veer off, only to return again and again.

Exhibiting more perseverance than good judgment, we stuck doggedly to our quest. At last, we were on the very edge of the canyon, looking downward upon the great brushy nest, in which we could see movement. We had no doubt but that the nest contained eaglets, for this was May.

Lacking a rope, it was impossible for us to proceed farther. Outwardly we conceded this fact with reluctance, but I suspect that we were each glad we could thus abandon the quest without "losing face."

At the time of my residence on San Clemente, the island's only other rapacious bird of



**The west slope of San Clemente Island is marked by vast cactus fields and abrupt outcroppings of volcanic rock. In these arid regions the California valley quail abound, as well as horned larks and meadowlarks.**

note was the American osprey, a bird that has steadily declined in number until now there may be none still remaining on the island.

Charles Frederick Holder, who visited San Clemente in 1910, and chronicled the event in his book *Channel Islands of California*, wrote of seeing many osprey nests on the pillars of rock below Mosquito Canyon, on the lee side, and on a trip around the island, reportedly observed "scores of their rough nests."

Sixteen years after Professor Holder's visit, I spent considerable time on the island and that year found only one nest on the rocks below Mosquito Canyon, although there were still nests at Smuggler's Cove, on the island's south side, and possibly elsewhere.

When I left San Clemente for the last time — just prior to the war — I am confident there was only one osprey nest on all the fifty-odd miles of shoreline. It was saddled on the topmost pinnacle of a volcanic promontory at Smuggler's Cove. Built roughly of large sticks, the nest was about five feet high and perhaps four feet in diameter. As we approached it, the two huge birds swooped and circled over us, screaming continuously. As with most birds of prey, the female is larger — having a wing spread measuring as much as five feet — and being brave to the point of foolhardiness. She gave every indication that she would only welcome an excuse to attack.

From time to time she would cease circling to poise motionless over the nest, and, with a grace belying her great size, would settle like a feather upon its edge. Her arrival set up a mighty clamoring and bickering from the youngsters in the stick pile. She would make answer in queer, gobbling tones, fondly nuzzling the young birds with her great hooked beak.

As might be supposed, the island shores abounded in sea birds. The southwest shoreline of San Clemente constitutes a picture that, once seen, remains etched in one's memory forever. There, for eighteen miles, great seas dash eternally against rock barriers, shaking the island's very foundations in their thunderous fury. The jutting headlands and isolated rock islands have been carved in myriad shapes by a million years of buffeting by wind and wave. Only a little imagination, coupled with the dim light of evening, causes these headlands to assume the aspect of witches' heads, fantastic gargoyles and strange prehistoric beasts.

There are great arches and deep channels through which the sea boils, charges and froths. Feudal castles of twisted black lava rise from landscapes of seaweed and waving kelp, while, over all, circle the ravens and cormorants, as black as the castles they guard.

At Seal Harbor the wind-driven surf pounds ceaselessly at the base of overhanging cliffs, which tower as high as a twenty-story building. Far above the water, in every fissure of the totally inaccessible rock wall, were cormorants' nests. Not even a human fly could have reached them.

On Pelican Point, at the extreme south end of the Island, and Bird Rock, off Northwest Harbor, are the greatest cormorant and pelican rookeries. Both of these places, at high tide, are themselves islands of several acres extent. I have frequently seen both of these rocks so closely covered with Brandt cormorants, California brown pelicans, and several species of sea gulls, that it was no longer possible to see the rock. How they managed to maintain any harmony whatever in such close quarters, was always a mystery.

When frightened, the birds raised such a din and clamor that it was impossible to stand in their midst and hear a person speak, even though his lips were placed closely against one's ear. Gulls were always plentiful around the island, but once, in March, at Smuggler's Cove, I came upon a sight I shall never forget. Many times before I had seen the Cove; had gloried in its wide, crescent-shaped strand washed by the warm waters of Mexico, and rich in peace and contentment. This night on the beach there were grouped thousands — tens of thousands — of California gulls. Standing as closely as they might stand, side by side. There were acres of them. The last rays of the setting sun cast a sheen of old rose over their snowy breasts and heads, and even touched with living fire the rolling surf beyond.

As I advanced upon them, the beautiful birds begun stepping warily sideways, the nearer ones eying me with curiosity and disfavor. One would fly — three — ten — to realight a few yards beyond. Suddenly, like a great section of the earth's crust bursting into the air, all this vast multitude took wing, and, as if under the command of a leader, circled and headed for the open sea. Morning found the beach clean and hard and utterly lonely, with not so much as a single bird to be seen.

Of the smaller land birds there were great numbers of California valley quail, most of them as fearless as barnyard chickens; mockingbirds, meadowlarks, mourning doves, horned larks, cactus wrens, warblers, linnets — the usual rank and file of California bird life.

The artemisia around our cabin abounded in Costa's hummingbirds. It was always interesting to watch the male's performance in the mating season. Rising a hundred feet or more in the air, he would plunge down past the female, faster than the eye could follow, swoop up on the rebound and dive again, over and over, until it seemed his tiny heart would burst from the strain. All the while he would produce a whirring sound, like the wind in the struts of an old-time airplane.

Through all of this strenuous performance, the lady of his choice would sit placidly on a twig, giving every evidence of boredom. Had she been a woman in the same state of mind, I am sure she would have been knitting or politely patting back a discreet yawn.

One day I hope to return to San Clemente.

If I do return, I want to find the ravens still reigning with a high hand. I shall again visit the cormorant rookeries at Seal Harbor, and even make the acquaintance of the great-great-grandsons of my little Costa's hummer. Perhaps — if I am not too old — I shall even try again to reach the eagle's nest at China Cove.

# Madagascar Periwinkle for Sunny Spots

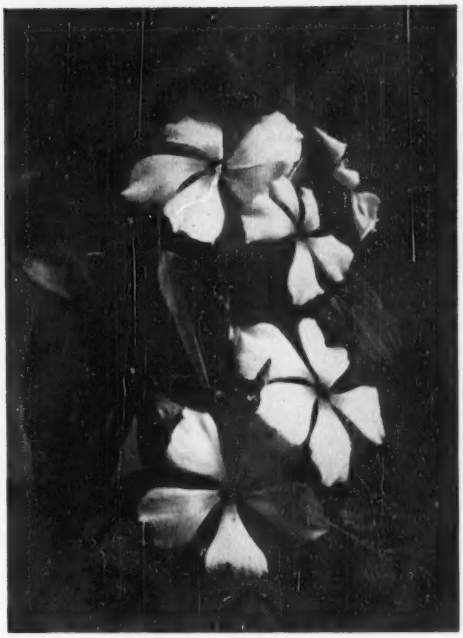
*By* DOROTHY K. SAMPSON

*Photographs from J. Horace McFarland*

THERE is so much pleasure to be found in just looking at a mass of Madagascar periwinkle, *Vinca rosea*, in bloom that it is strange it is not seen more often in gardens. To most people the periwinkle is just another hardy, dwarf plant for the flower border. It is not generally known, however, that there are two kinds. The *Vinca minor*, or myrtle, is the common, creeping type, with shiny leaves and early blue flowers. *Vinca rosea*, the Madagascar periwinkle, also has foliage that looks as though it has just been waxed, but the flowers are white and rosy purple, and the plant grows about a foot high. The two varieties have quite different habits of growth.

Several years ago, on a late spring vacation trip to the east coast of Florida, I first became interested in the lovely Madagascar periwinkle. Although not a native of Florida, it has become widely naturalized in that State. It grows in profusion along Miami Beach's famed Collins Avenue, the white and rose flowers spilling from neat borders onto velvety lawns and intermingling in natural gracefulness. It is an artless little flower, yet it holds its own among the glamorous and exotic *Hibiscus* and *Bougainvillea*. However, the few people I asked about it were unable to tell me its name.

Every year since then, on our annual excursion to the land of sunshine, I have admired the loveliness of this plant more and more, but not until last spring did I learn that it is called periwinkle. One morning, through our hotel coffee shop window, I noticed a cluster of these pert little flowers growing in a vacant lot next door, their white, gardenia-like faces upturned to the sun, and as healthy as if they were being nurtured by the highest paid gardener on the beach. The next morning some of the blossoms were in a small vase on our table when we went down for breakfast. A few chance remarks, aimed at just the right time to catch the ear of our waitress, proved her to be a bit flower-minded, too, and this gave me the cue I had been waiting for. She probably wished I had never seen a periwinkle by the time I got through plying her with questions. Anyway, she told me what I wanted to know — the flower was the periwinkle, and it bloomed there all year round just as profusely as it was then.



**One of the white flowers of Madagascar periwinkle. It also comes with a rosy purple bloom, and its leaves are shiny as though waxed.**

For the rest of my stay in Florida I seemed to notice it more than ever. I found it in front of the most luxurious hotels; in crevices between buildings and sidewalks, growing in anything that even faintly resembled soil; in clusters beside the walls of the neighborhood theatres; in parks. It was everywhere, and it amazed me that it could grow so abundantly with apparently little or no attention or care.

Of course, the name periwinkle was not entirely unfamiliar to me. My grandmother used to have periwinkle in her garden, but hers was the *Vinca minor*, the popular and common occupant of most of our old gardens, where it loved shade more than sun. I was sure that I had not seen *Vinca rosea* back home in Virginia, but, home again, I discovered that my next-door neighbor had a plant brought from a visit to a friend in the northern part of Virginia. It flourished all summer, and bloomed beautifully, but in a region of frost it had to be taken indoors for the winter.

Finding a plant I had admired a thousand miles away growing literally in my own back yard made me bring myself up-to-date on *Vinca rosea*. This proved at first to be more of a job than I had anticipated. I haunted book stores and libraries. I wrote for information. No one, it seemed, in this part of the country, knew much about *Lochnera rosea*, *Vinca rosea*, or Madagascar periwinkle — all one and the same, but with

**Requiring a sunny spot, this periwinkle makes a lovely mass of bloom throughout the summer and is excellent for borders.**

varying names according to the type of reference.

One book did tell me, and I quote in part: "*Vinca rosea* (Periwinkle) — White, Pink, Red. Given plenty of water it will thrive even through a hot, dry summer. Good for the border and for bedding. An annual that might well be more often grown, as it is free from pests." I liked that part, "an annual that might well be more often grown. . ." That expressed exactly what I feel. Here was a healthy plant, free from pests, lovely to look at, nice to cut for house, certainly taking to the sun, neither too tall nor too low. What more can one ask?

Seeds of this periwinkle, sown indoors in a cold frame in February, should be thinned to one inch apart when the seedlings show a second leaf. They may be planted outside, six inches apart, in from thirteen to fourteen weeks. Seeds may be started outside after danger from frost is past, but such plants will not bloom as early as those propagated in February. When the plants have gotten a good start, water the bed plentifully, but not excessively. A good soaking every two or three days is preferable.

By poking into all sorts of encyclopedias and garden books, I have since found out other nice things about my little-known flower. Here are five of them: One of the few requirements is a sunny exposure. The plant grows about a foot high. It is nice for bedding because of its rich foliage and showy flowers. It produces freely throughout the summer. It is pest-free.

These things make the Madagascar periwinkle big news if you are looking for something to grow on the sunny side of the house. Squeeze them into the narrow spaces where the shade-loving plants would wither and die.

I begged a slip of my neighbor's hardy plant and put it in water until rootlets appeared on the end of the stem. Then I planted this in a little pot filled with soil from my garden. Although it has not grown much yet, it bloomed continuously and the waxy leaves were bright and shiny. Given a spot in the sunniest window, just to make it feel at home, it brings Florida and warm weather and sunshine a little closer. Perhaps one of these days this delightful flower will be as popular farther north as it now is in the South. And I know that I, for one, shall certainly grow *Vinca rosea* in generous masses in my flower garden when spring comes.

# Olives

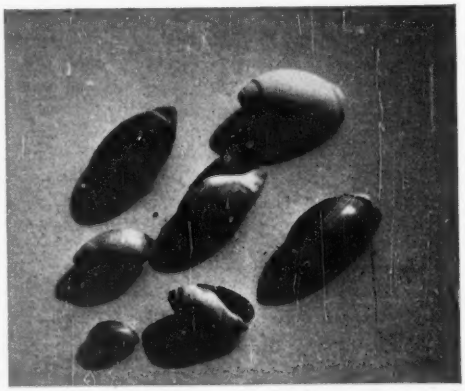
*By* RUTH DUDLEY

Sea animals have pronounced characteristics. Like people, some are content to settle down in one place for life; others are seemingly forever on the go. The olive fits into this latter group.

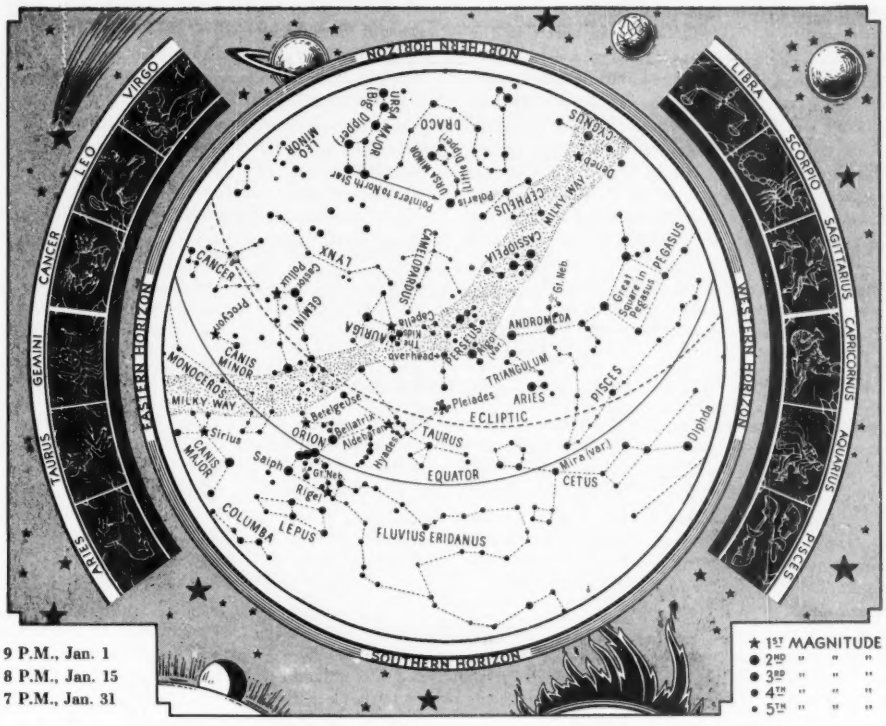
The olive has a handy plow-shaped "foot" that works speedily. It can quickly whisk under the sand and out of sight. This animal likes to lie buried just far enough down so its shell is completely covered. In order to get water uses its handy little "pipe," which it sticks up through the sand into the clear water.

You may dig down into the sand at low tide and sometimes find a large group of these olives. But, if you leave the spot, even for a short time, do not be surprised when you return to find every one gone.

Olives vary in color. Some shells are dove-colored,



with purple trimmings, and others are nearly white.




**To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.**

# The Heavens in 1951

*By* ISABEL M. LEWIS

DURING the coming year there should be noticeable decrease in all forms of solar activity because the sunspot maximum period and its secondary peak are now definitely passed. In May, 1947, the monthly value for the area of spottedness of the solar surface was the greatest recorded over a period of nearly one hundred years. Never had there been a period of solar activity recorded in which so many sunspots of exceptional size had been observed. A secondary peak of spottedness occurred in April, 1948. Since then there has been a definite decrease in the number and size of sunspots observed. Radio fadeouts, great magnetic storms, intense ultraviolet radiations, exceptionally brilliant auroral displays are noticeably decreasing, and from now on a comparatively quiet period of solar activity may be expected. The sunspot minimum period, when the solar surface will be most quiescent, may not be expected, however, before the years 1952 or 1953.

In 1951 there will be two eclipses only, both annular eclipses of the sun. In any one year there may be as few as two eclipses, or as many as seven. When there are only two eclipses they must both be eclipses of the sun. There may be seven eclipses in a year, of which five will be eclipses of the sun and two eclipses of the moon, or four eclipses of the sun and three of the moon. If there are three lunar eclipses one of the three must come in December. When there are only two eclipses of the sun in a year they will be large total or annular eclipses. An annular eclipse of the sun occurs when the moon is so far from the earth that its apparent size is less than that of the sun and the moon does not completely cover the solar disk. A small ring of sunlight is then visible surrounding the dark disk of the

moon at the time of the greatest obscuration.

Both eclipses of 1951 will be visible partly in the United States. The first annular eclipse will occur on March 7, 1951. The path of the annular phase is very narrow at one point and there the annular eclipse lasts for only 59 seconds. It crosses little land — South Island of New Zealand soon after sunrise, Pitcairn Island at mid-day, and Central America late in the afternoon. The greater part of the eclipse region will be in the South Pacific, but the northern limit of the eclipse will cut diagonally across the United States from southern California to the St. Lawrence River, including, also, part of the Great Lakes region. Small partial phases of the eclipse will be visible in the southern, central and eastern states, the sun setting eclipsed in some of the eastern and southern states. There will be large partial eclipses in the Canal Zone and on the northwest coast of South America. There will be a second annular eclipse of the sun on September 1, 1951. The maximum duration of the annular phase of this eclipse will be about 2 minutes, 44 seconds.

The sun will rise eclipsed over much of the central and eastern part of North America. The annular phase will be visible in the northern part of North Carolina and southern part of Virginia directly after sunrise. Winston-Salem, Petersburg, and the area around Norfolk will lie in the path of the annulus. At Washington there will be a large partial eclipse, greatest magnitude about 92 percent. After leaving the Atlantic coast in the vicinity of Norfolk, near sunrise, the path of the annulus crosses the Atlantic Ocean to the equatorial bulge of Africa, crosses the continent diagonally to the southeast coast, and ends in Madagascar at sunset. Large partial phases of this eclipse will be visible in the eastern states, and all of Africa, the British Isles, and southwestern Europe will lie within the eclipse area. Although annular eclipses of the sun are not as valuable scientifically as total solar eclipses, observations of the eclipse of September 1 will undoubtedly be made along the path of the annulus and elsewhere in the United States.

Mercury, smallest of all the planets, nearest to the sun, and most rapidly moving, is visible only in the morning twilight when west of the sun, and in the evening twilight when east of the sun, for ten days or two weeks at a time, near the times when its angular distance from the sun is greatest. These greatest angular distances from the sun are called the greatest elongations of the planet. There will be three eastern elongations of Mercury in 1951 — on April 5, August 3, and November 28. For a week or so before and after these dates is the time to look for the planet in the western sky directly after sunset. Mercury is a brilliant little planet at such times, even though the brightness of twilight dims its light considerably, and one is usually surprised at its brilliancy and its beauty when finding it for the first time. Mercury will be visible in the morning sky before and after the dates of its greatest western elongations, and for approximately the same length of time as when seen in the evening sky. The dates of western elongation in 1951, when Mercury will be seen in the morning twilight, are January 23, May 22, and September 16.

When the ecliptic, near which the orbits of the planets always lie, rises most sharply from the western horizon, as in the spring, the eastern elongation that comes nearest to that date will be the most favorable one for seeing the planet in the evening twilight. In 1951 the most favorable time for seeing Mercury in the evening sky will be for a week or more before and after the greatest eastern elongation of April 5. For the same reason the most favorable time to look for Mercury in the morning sky will be for a week or more before and after the date of the greatest western elongation, which comes in the early fall. It is then that the ecliptic rises most sharply from the eastern horizon. In 1951 that date will be September 16.

Venus, as well as Mercury, has its dates of eastern and western elongations when it is farthest east or west of the sun. This planet, however, second in distance from the sun and inside the orbit of the earth, has a much greater angular distance from the sun at such times than Mercury and is, moreover, the most brilliant of all the planets. Even when farthest from the earth at the time of its superior conjunction with the sun, Venus disappears from view in the glare of the sun for only a few weeks. Even when the planet does appear again in the evening sky after passing superior conjunction it is still more brilliant than any other planet. It was on November 13, 1950, that Venus was last in superior conjunction with the sun. The planet will start 1951 still poorly placed for observation low in the southwest after sunset, but it will be interesting to watch this planet during the winter and spring and into the summer. It will appear higher in the western evening sky each evening until on June 25 it will be at its greatest eastern elongation (continued on page 52)

# When Men Companion Stars

*By* JOHN GALLINARI WHIDDING

When men companion stars, they stand aware
Of earth's wide littleness and puny hold
On space as measureless as time is old;
They stand concerned with marvelous despair
For man's importance that a breath of air,
Denied, may cancel. Only for the bold,
Exploring heart the vaults of gold unfold
A challenge that the craven cannot share.

Ask of a friend if he can face the night
Acknowledging his weakness in the land
As David did, who marveled at the Hand
That set the singing planets in the height:
Beware that man — be sparing of your trust
In him who hangs his head and toes the dust.

# The School Page

*By* E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education. The American Nature Association

## MOLLUSKS IN THE SCHOOL

IF CHILDREN do not bring the shells of mollusks to the school teacher, then these are about the only kind of Nature specimens thus neglected. It has been my experience that slugs and snails and mussels do interest children greatly, so let us see what we can do to further this interest.

We will not consider seriously the study of fresh-water bivalves in a school room. Such animals are too hard to keep alive, and on this page we want to deal primarily with the study of living things.

There is no reason why every child should not maintain his own private terrarium and aquarium as a place in which to house a land snail, or a slug, or a pond snail. A simple shell vial an inch in diameter, and two or three inches long, with the open end covered with gauze, and fastened to some broad support with household cement to prevent it tipping over, should yield a surprising number of worthwhile experiences. Such a little vial terrarium may house a slug or land snail, or water may be added and it may be quickly converted to a tiny aquarium. A sprig of pond weed in the water may provide food for the pond snail, and the parings of an apple dropped into the terrarium may provide enough food for a snail or slug for long enough to permit observations of what may happen both to the apple and to the slug or land snail.

I have found that a shoe box with a black paper floor makes a useful laboratoriette for studying slugs and land snails. In such housing I can attempt to induce my animal to go to one end of my box by putting in a glass window in one end and placing a piece of apple that he can see easily through the glass, assuming he uses sight to locate his food. In making the trip the snail will leave its slimy trail on the black paper on the bottom of my box. If I do not get satisfactory results in this way I may decide to test my snail to see if it locates food by the sense of smell. To do this I may place some apple food at the end of the box through which the snail could not see and protect it by a barrier over which he cannot see. If the snail smells this unseen apple, and chooses to go towards it instead of going in the opposite direction towards the visible apple behind the glass, I may surmise that the snail locates food by smell instead of by sight. I do not wish to deprive anyone of the fun of finding what the answer may be. If you are not yourself interested in learning through this method then just let some of your children try to find out for themselves and for you.

Since the tentacles of land snails are highly sensitive, it may be well to experiment to see to what stimuli they respond. Will a movement of warm air bring any response? If a snail is on or near a piano can you induce movement of the tentacles by striking any key or particular keys? Can you, by a whistled sound, get any evidence that the snail senses your presence? If you try this avoid whistling towards your snail because he may be influenced not by sound but by air movement. Try to see if a small pad of cotton put on a toothpick and soaked in sugar will stimulate any movement in a given direction. Try vinegar, carrion, perfume, and other substances that you recognize as having distinctive smells, and note which, if any, arouse the interest of the tentacles of your snail. Try to find out if your snail can locate water, if it needs water, and if it will climb *up* to reach a water supply, or whether its instinct to find water is geared to its sense of something other than up or down.

You may care to separate two mating slugs or snails and give them the choice of seeking each other's company again, or of having a good meal, to see if the urge to reproduce seems to be greater than the urge to eat. You may starve a snail and observe how long it takes for him to satisfy his appetite. It may be possible, with the use of the black paper bottom in your box, to have your snail record some of his actions in darkness. Does he seem to behave similarly in darkness and in light? At what temperatures — high and low — does your snail tend to cease activities, and how do your findings here help you determine what you may observe in the outdoors? If you seek snails under old logs in the woods in winter you may find them now and then. Do you see any reason to believe that these animals are hibernating soundly, or can they be brought into an active state simply by warming them up temporarily? Place a snail that has been deprived of water for some time between two small rags. Let one of the rags be wet and one dry. Does the snail show evidence that he can somehow sense to which he can turn for relief?

If you wish to work with pond snails instead of with land snails you may find equally profitable experiences. A little glass vial aquarium, such as I suggested earlier, may be stocked from a stream, or from an aquarium, with a single clutch of jelly-covered eggs. If the date on which the eggs were laid is known, one can watch to see how long it takes for the eggs to hatch, and can even observe the development of the young snails while they are still protected by the jelly mass. It might be well to stock one aquarium only with left-handed pond snails, another with right-handed pond snails, and a third with disc pond snails, if this latter classification can be considered legitimate. When supplies of eggs appear in these different aquaria you may get some idea as to whether there are sufficient differences that you can predict what kind of snails will come from one kind of egg mass and what kind from another. You may also note if the nature and the color of any of these egg masses change with age.

In the summer or fall, or sometimes even in winter, clutches of eggs of land snails may be found. If these happen to be laid in a terrarium it may be worth while to notice if a given egg-laying snail lays but one clutch of eggs, or if it moves on and, at a later time, lays another clutch. Can the color of the eggs of land snails be changed by drying them or by soaking them? If possible pile a goodly collection of eggs of land snails into one pile. Leave them to develop normally and notice if those exposed to the air do as well as those that were covered by other eggs and not too much exposed to circulating air.

By all means carry on some simple experiments to show the food preferences of different snails and slugs. In the insert in the center of this magazine it is suggested that some snails are carnivorous while others prefer plant material, living or dead. Plan some way in which the children and you can be satisfied that these statements are true. Put two or more of the carnivorous snails in a container together to see if their aggressive dispositions carry them to the point where they will attack their own kind, or whether they prefer to attack other animals first.

Notice in the bottom of an aquarium in which there are many pond snails how there may accumulate a great amount of excreta dropped by the snails feeding on the plants above. Point out how the activities of these snails must serve to clear the water of some plant material and may serve to let light reach deeper into the water than would otherwise be the case. Decide, if you can, what effect this might have on the internal economy of the life of your aquarium.

Above all, do not think that to study pond snails or land snails that we need a big, expensive terrarium or aquarium. A shell vial or an old bottle may teach more lessons than a huge classroom aquarium, and if anything happens to it it makes little difference. Really there are few laboratoriette animals that can beat pond snails or land snails for yielding profitable experiences. Do not pass them up, please.

# Camera Trails

*By*
EDNA HOFFMAN EVANS

HERE we are, beginning another New Year. It certainly seems as though Old Father Time is traveling by jet propulsion these days.

But there is a thrill about new things, whether they be new years, new cars, new babies, new puppy dogs, or new cameras. While I cannot speak from personal experience about the thrill a new baby brings, I have observed the effect of such an advent upon my friends. And I do know about new cars, new puppies, and new cameras.

My most recent "new" experience concerns the latter of the three items just listed. In fact, the feeling of newness, the hesitancy of inexperience, and the pulse-quickening pleasure of venturing down a new and untried road is still with me whenever I take a picture with my new camera. Thus, as the New Year comes, I think it is altogether appropriate to write about the process of getting acquainted with a new camera.

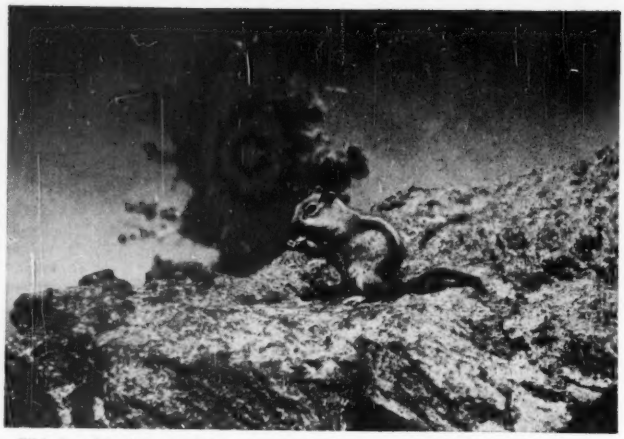
Of course, I still enjoy picture-taking with my old camera. It is a friend, tried and true, and its place in my affection is unshaken. I always use it when I want to be certain of results for I know, from years of experience, that if I handle it properly it will not fail me. When mistakes occur, I am at fault, not the camera.

Why, then, if I love my old camera so well, did I get a new one? The answer is similar to the ones I have given many times in response to the question, "What kind of a camera shall I buy?"

All cameras have their limitations. No single one can do everything. My old camera is a 4 x 5 Graflex with an f:4.5 lens and double extension bellows. Add a 16-inch telephoto lens as auxiliary, a sturdy tripod, filters, light meter, and extra film packs and the outfit is pretty heavy. I know. I have carried it up and down mountains, on deserts, and through swamps. I have used it on land and on the water. After carrying it for a mile or two, even in smooth country, such an outfit can seem as big as a box car and three times as heavy.

There is the matter of expense, too. The price of film, along with the price of everything else, has climbed steadily. Color film always has been prohibitive in price. Then, too, since the Graflex is not readily adaptable for flash photography, I had another drawback to contend with.

A smaller, lighter, less-expensive-to-operate camera with a flash attachment was obviously the answer. There are many good, small cameras on the market. What kind should I buy?



**This is a black-and-white print made from a 35 mm color transparancy.**

To make a long story short and to cut the search down to a minimum, let us say that I listed as "musts" a good fast lens, shutter speed up to 1/1000th, reflex focusing, and ability to take pictures at less than a three-foot distance.

The camera I bought is a Kine-Exakta II with an f/2 lens and an extension tube that allows me to focus down to the fraction of an inch in extreme close-ups.

When the decision was finally made and the order placed, it seemed as though the camera would never arrive. When it finally did, the dealer and I spent a couple of delicious hours just gloating over the outfit. Then came the first shots — all kinds of experiments just to see how the new toy worked. When the first roll was finished there was another period of impatient waiting, this time to see the actual results of the experimentation. It was the same with the first roll of color film — I thought those transparancies must be traveling back by ox cart instead of via air mail.

**This is how the Graflex recorded the chipmunk on Super XX film. It is one of the two shots that didn't "get away."**

It was not long after the camera's arrival that I started west across the country, ready to take pictures, large and small, in black-and-white and in color, of everything along the way. And so what happened? Rain, of course. Rain in Florida, in Georgia, and in North Carolina, rain in Tennessee, Kentucky, Missouri and Kansas. Mile after mile rolled behind as clouds hung low and rain dripped from them, effectively blotting out any hope of pictures in the Great Smokies and in the Ozarks — or of anywhere between. To the owner of a new and almost untried camera, such weather was completely exasperating.

We were well out on the plains of Kansas before the rain clouds disappeared. Then the skies remained clear and the sun shone bright as we continued west into Colorado and began the climb through the beauties of Rocky Mountain National Park. There, particularly when the aspens turn gold in the late summer, is a color photographer's paradise.

The business of trying to use two cameras has its drawbacks, as I soon found. Handling a camera, like driving a car, involves a number of actions that are completely automatic. The routine becomes fixed by practice and is performed without conscious thought. But when two routines are different — watch out!

Despite the majesty of the Rockies, despite the colors, the vastness and grandeur of the scenery, the things that impressed me most were the chipmunks that scampered busily about among the rocks. Why? I do not exactly know. Chipmunks were something new in my experience. I have always admired pictures of them, and here was my chance to take some myself. The little striped fellows were tame enough to come up and accept food from one's hands. Then they stuffed

their cheeks and posed against a background of reddish rock, green trees, and blue sky. It was wonderful!

I picked a spot up on a rock, with a bit of pine silhouetted against the sky for a background. Then I baited my spot with a couple of peanuts and waited, my eye glued to the ground glass of my new camera. Before long up whisked a chipmunk. He made short work of the peanuts but, while he ate, I was busy taking his picture. More peanuts brought him back again. He was so close that I could even see the highlight in his bright black eye.

Then I shifted to the Graflex, pulling out the safety tab and beginning a fresh new pack of film. My chipmunk model was getting pretty well filled with peanuts by this time, and so were several of his friends. Picnickers, too, were finding my rock to their liking. But I was happy because I had four wonderful Graflex chipmunk pictures. That is, I was happy until I noticed something. In my enthusiasm and excitement I had neglected to switch techniques when I changed cameras. The little new camera has no slide and no tabs to be pulled. One flick of a lever and a new film is in place and ready for exposure. The Graflex, on the other hand, definitely has a slide and I had forgotten to remove it. My four beautiful chipmunk pictures, then, were nothing but blank, unexposed negatives.

I tried for a couple more shots, but none were as good as the ones I had missed. Only another camera fan can know how sick I felt — it was a real, physical sickness that lasted with slowly decreasing pangs for several days thereafter. It was not until the color films came back from the developer and I found I not only had some good transparencies, but could get black-and-white prints as well, that I felt completely recovered. But those four lost chipmunk pictures have gone to join an ever increasing list of wonderful opportunities that got away.

It is not easy to shift from one camera to another. Techniques and routines do vary. I like my new camera and enjoy the increased versatility that it gives me. But I try to think twice now, when I change from little camera to big one.

## LATE AND IMPORTANT

Announcement of the Sixth Annual Chicago International Exhibition of Nature Photography arrived too late for inclusion in the December section, and Camera Trailsmen who may want to enter pictures or slides will have to hurry because the deadline for entries is January 15. The exhibit is being sponsored by the Nature Camera Club of Chicago and the Chicago Natural History Museum, and entries will be on display at the museum February 1 through 28. The two divisions, prints and transparencies, are further classified into animal life, plant life, and general. An entry fee of $1.00 is charged in each division and no more than four entries may be submitted in either division. For entry blanks write to the chairman, H. J. Johnson, 2135 Concord Place, Chicago 47, Ill.

## FOR THE BOOKSHELF

An unusually large amount of material has collected since the last section was written, so much that I cannot possibly do justice to it all. The book and pamphlet material has been more interesting than usual and so I am going to concentrate on it.

Eastman has released an entirely new publication, the *Kodak Color Handbook*, to serve as a handy reference work and guide for advanced amateur and professional photographers. Four data book sections are included in the metal-ring binder cover — "Color as Seen and Photographed," "Color Photography Outdoors," "Color Photography in the Studio," and "Kodak Color Films." Together they give 248 pages of color know-how, plus more than 100 full-color illustrations. Other color data books are planned for future publication. Meanwhile, the four current ones can be obtained only in the *Kodak Color Handbook* through Kodak dealers. The handbook is priced at $4.00.

Other recent Kodak data books deal with "Filters and Lens Attachments" and "Stains on Negatives and Prints."

Still another Eastman publication, worth inclusion in any science-minded photographer's library, is *Photography in Astronomy*, written by Dr. E. W. H. Selwyn of the Kodak Research Laboratories, Harrow, England. This book deals with sky photography from the astronomer's viewpoint, and is well filled with formulae, diagrams, and pictures of giant telescopes. Often, when I look at a gloriously star-spangled night sky, I wish I could record it on film. After perusing Dr. Selwyn's book, I know my wish is not very practical — still, it is nice to know the real scientific facts about astronomical photography. The book costs $2.75.

Also recently off the press is the new *Leica Manual*, published by Morgan and Lester and released through E. Leitz, Inc., New York, distributors of the Leica camera. The 432-page book combines the work of 22 photographic writers into 25 chapters. It also includes 200 black-and-white and color photographs. Available at most photo stores, the price is $5.00.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# Grasslands Monuments

In December, 1948, members of the Natural Resources Council of America met with representatives of the U.S. Department of Agriculture. Following that meeting, an Exploratory Committee on Grassland Monuments was created to develop information that might be mutually helpful to the Department and the Council. After survey and various conferences, a committee of O. S. Aamodt, Agricultural Research Administration; W. R. Chapline, U.S. Forest Service; F. G. Renner, Soil Conservation Service, has made its report and recommendations, as follows:

1. The establishment of publicly owned natural grassland areas to assure preservation of a representative area typical of each of the major grassland types of the Nation is important and urgent. The Department of Agriculture should give support to the establishment, protection, preservation and study of such areas.

2. The primary purpose of such areas should be the preservation and study of natural grassland areas. Secondary objectives should include consideration of education, recreation, inspiration, and other related values.

3. In carrying out the primary purpose — the preservation of the grassland aspect — consideration should be given to the maintenance of certain species of the original natural fauna. In order to assure preservation of the grassland aspect, including the natural recovery of deteriorated areas, unrestricted development or increase of certain species of the natural fauna may require control.

4. There are six major grassland types that should be considered for representation in the establishment of such natural grassland areas. These types are (1) the tall grass prairie, extending from eastern North Dakota southward to Oklahoma and eastward into Illinois; (2) the mixed prairie, extending from North Dakota and eastern Montana southward to northeastern New Mexico and the panhandle of Texas; (3) the coastal prairie, especially of southeastern Texas and south Florida; (4) the desert plains grassland of southwest Texas, New Mexico and Arizona; (5) the Palouse prairie in Idaho, Oregon and Washington; and (6) the Pacific Prairie of the San Joaquin and Sacramento Valleys in California.

5. In each of these major natural grassland types, it would be desirable to establish, if suitable reservations are not already available, an area of 20,000 acres or more.

6. In addition to large grassland areas in each of these six major natural grassland types, additional small natural areas varying in size from a few hundred to several thousand acres each doubtless would be advisable to represent localized phases or subtypes of the major grassland types. Such small areas might be set aside within experimental ranges already available, national or state parks, or other suitable reservations, or be established as separate units.

7. Among specific purposes which justify establishment are the following:

*Research.* In research it would be advisable to have a group specifically assigned to each of the major natural areas to make an initial survey of the situation relating to vegetation, natural fauna, existing environmental conditions due to past use, etc., and to record periodically changes occurring naturally, including study of natural biotic factors, the interrelationships between reasonable numbers of the original fauna and the flora, the natural recovery of deteriorated areas, the life histories and growth habits of individual plants and animals, and the whole ecological background of natural plant development and restoration in its relation to its component parts and the basic soil that maintains the vegetation. In addition, other researchers should have access to the area for supplemental studies.

*Check Areas As Guides To Land Use.* A highly important reason for preserving natural grassland areas is that they are valuable as ecological standards. This is a practical value, particularly applicable to conservation and land use programs. Natural areas are unique for what they can tell us of the potentialities of land for use. Undisturbed natural areas are few in most parts of the United States. Yet selected areas, properly situated and of appropriate size, protected and set aside now could in time teach us a great deal that would be useful. Such knowledge would be of practical value not only in range management, but in many other fields of resource use as well. Thus, along with its other values the establishment of nautral grassland areas can serve a utilitarian land use purpose that should be given conspicuous attention.

*Education.* While it may be advisable to restrict carefully ingress to the greater part of each major natural area, certain parts should be dedicated to and made accessible to those who come to observe or otherwise use for educational purposes the parts of the natural areas dedicated to that purpose.

*Recreation.* Closely related is recreation, and it may be necessary to dedicate limited portions of the natural areas to recreational development to facilitate the use and enjoyment of the natural areas, or those parts which can be made readily accessible to the general public.

8. There are very few large areas in the main grassland types that are already available which might serve this purpose. Among those to be considered, however, are the Theodore Roosevelt National Memorial Park in western North Dakota, the Badlands Monument in South Dakota, the Wichita Mountain Wildlife Refuge in Oklahoma, and the Everglades National Park in southern Florida. Consideration should be given as to whether the present purpose of these areas could be broadened to serve the purpose designed for the natural areas herein under consideration.

9. If it is found that these areas already mentioned are not suitable for the purpose of preservation of natural areas, then it would seem necessary for the Federal Government, or private organizations which might be interested in the establishment of such areas, also to purchase the necessary lands, now in private ownership, of the grassland types they represent in order to obtain suitable natural grassland areas, or even to expand any that are now available.

10. To assure effective continuity in the ownership, preservation and research, and to coordinate the several areas, jurisdiction and administration of the six major units should be by the Federal Government. The National Park Service of the Department of the Interior may be the agency which can satisfactorily assume responsibility for their acquisition, custody, maintenance, and administration. In view of the responsibilities of the Department of Agriculture for research in the field of agriculture and of the Department of the Interior for research in the field of wildlife, the two Departments should participate jointly in assuming responsibilities for such research activities as are undertaken, in accordance with their customary procedures. Smaller units within existing federal reservations would presumably be administered by the agency administering the larger unit of which the natural grassland area is a part. Other smaller areas would logically be owned and administered by states and local units of Government.

11. There does not appear to be any appropriate legislation to meet the specific need with regard to the large areas as outlined above. If the proposal is approved, it would doubtless be advisable to prepare a suitable bill to present to Congress embodying the essentials, authorizing the necessary funds for acquisition, administration and research, and setting forth the necessary restrictions on the type of activities to be carried out within the natural area as proposed.

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## Fauna Preservation

*Oryx* is the new name of the Journal of the Fauna Preservation Society in Great Britain, which recently changed its name from The Society for the Preservation of the Fauna of the Empire to the simpler and even more inclusive name. The Secretary of the Society is Lt. Col. C. L. Boyle, who succeeded the late Henry G. Maurice, who passed away in May, 1950. Offices of the Society are care of the Zoological Society of London, Regent's Park, London, N.W.8, and annual membership is one pound, life membership ten pounds.

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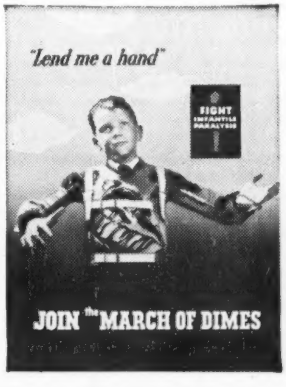

## MORE REVIEWS

### Racing Pigeons

*The Book of the Racing Pigeon.* By Carl A. Naether. New York. 1950. David McKay Company. 244 pages. Illustrated. $3.50.

Several years ago the author, who is Professor of English at the University of Southern California by profession and pigeon enthusiast by hobby, wrote *The Book of the Pigeon.* This earlier volume has become a standard work and has been through several printings and three editions. This present volume has been written to provide more inclusive treatment of the racing pigeon than was possible in the original work, and, second, to give a broad survey of methods employed by fanciers generally. Other books on the racing pigeon have presented one man's opinion and experience, but not a true picture of the racing pigeon activity. Professor Naether has set out to remedy this situation and appears admirably to have succeeded.

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### British Animals

*Wild Animals in Britain.* By Oliver G. Pike. New York. 1950. The Macmillan Company. 231 pages. Illustrated in color and black and white. $3.75.

This is a popular treatment of the mammals, reptiles and amphibians of Great Britain by a naturalist who has studied and photographed these dwellers in Britain since his boyhood. Mammals have been extensively persecuted there, and many forms are no longer to be found. However, with the increase in reservations affording protection to wildlife it is hoped that there will be increases in numbers.

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### Eastern and Central Trees

*A Natural History of Trees of Eastern and Central North America.* By Donald Culross Peattie. Boston. 1950. Houghton Mifflin Company. 606 pages. Illustrated by Paul Landacre. $5.00.

This is truly a tree book that is different from any of the many other books on tree identification. For each tree the essential information with respect to names, range and description is given as a preface to a delightful discussion of each tree in the economic history of the country and its place in the landscape of America. Thus one has essential information supplemented by charming and informative tree essays in Mr. Peattie's fine style, all illuminated by the excellent illustrations by Mr. Landacre. This is, indeed, a book to treasure.

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### Sir Arthur Keith

*An Autobiography.* By Sir Arthur Keith. New York. 1950. Philosophical Library. 722 pages. Illustrated, $4.75.

This is the personal story of Britain's eminent scientist, anatomist and anthropologist; the story of a long life; a story completed as he ended his eighty-first year. Sir Arthur begins his story with an interesting variation on autobiographical treatment by devoting a chapter to the background against which he writes. This was the parish of Downe, in Kent, where, from the window of his study, he could see Down House, where Darwin wrote his books. To this spot Sir Arthur has retired, to occupy himself to some extent as Master of the Farm that was given to the Royal College of Surgeons, there again to take up agriculture to which he was bred in his Scottish youth. The chronological story that follows this introductory chapter is the story of association with many great contemporaries and with changing times in Britain. It is a charming autobiography, human and full of dry humor.

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### British Nature

*British Butterflies.* By George E. Hyde: *Eggs and Nests of British Birds.* By R. L. E. Ford: *Wild Flowers.* By W. R. Philipson: *Birds of Britain.* By Wilfred Willett. New York. 1950. The Macmillan Company. $1.25 each.

This quartet of books was on our desk awaiting our return from a trip to Europe, including a stay in England during which time we toured southwest England in a little, self-driven car. When we were able to spare time from reminding ourselves to stay on the left side of the highway, we were taking in the British landscape and its Nature inhabitants. We could have wished that we had had these books with us. However, they should be of interest to the many people who plan to visit Britain next year, a celebration year. They are all popular, introductory texts to those phases of Nature in Britain that the titles indicate.

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### To Attract Birds

*Handbook of Attracting Birds.* Thomas P. McElroy, Jr. New York. 1950. Alfred A. Knopf. 163 pages. Illustrated by Lambert Guenther. $2.75.

This is a simple and practical little book on hospitality — hospitality to birds through the provision of alluring homes, feeding stations and natural food for avian guests. Advice is given on bird study, on establishing a sanctuary, on caring for wounded or orphaned birds, as well as the essential phases of bird attraction.

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### Quakers

*Quakers in Science and Industry.* By Arthur Raistrick. New York. 1950. Philosophical Library. 361 pages. Illustrated. $6.00.

This is an account of the contributions to science and industry made by Quakers during the seventeenth and eighteenth centuries, despite much persecution and other attempts to limit them. Among these were many distinguished naturalists and botanists, including John Bartram, Thomas Lawson, Peter Collinson.

### Friedmann's Birds

*The Birds of North and Middle America, Part XI.* By Herbert Friedmann. Washington, D.C. 1950. The Smithsonian Institution. 793 pages. Available from the Superintendent of Documents, Washington 25, D.C. $4.00.

This is Bulletin 50 of the United States National Museum, Smithsonian Institution, and is the eleventh in the series providing a descriptive catalog of the higher groups, genera, species and subspecies of birds known to occur in North America, from the arctic lands to the Isthmus of Panama, the West Indies and other islands of the Caribbean Sea, and the Galapagos archipelago. This volume treats with the American vultures, the hawks, eagles, kites, harriers and Old World vultures, the ospreys and the falcons and caracaras.

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### Shoes and Feet

*Shoes and Feet to Boot.* By Alan E. Murray. Bridgeport, Conn. 1950. Alan E. Murray Laboratories. 139 pages. Illustrated $3.00.

This book is, perhaps, a bit outside the proper scope of *Nature Magazine* but we found it interesting and feel that we should, at least briefly, call it to the attention of our readers. It is the story of the convictions of a man who felt that we were abusing our feet, suffering unnecessarily from this abuse, and who went about to remedy this situation with originality and imagination. If your feet "are killing you" it would seem that Mr. Murray could tell you the reason why.

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### Marine Geology

*Marine Geology.* By Ph. H. Kuenen. New York. 1950. John Wiley and Sons. 568 pages. Illustrated. $7.50.

The geology of the seas has been a neglected phase of the development of geological science, due, of course, to paucity of knowledge of this subject. It is only recently that more intensive studies of marine geology have been made. Even so, this is a subject still largely neglected in teaching. It is to remedy this latter situation that this text, which brings together what we know of the geology of the ocean floor, has been prepared.

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### Pequot Trails

*Pequot Trails* is the title of the quarterly of the Pequot-Sepos Wildlife Sanctuary, Mystic, Connecticut. This journal is edited by Mrs. Arthur M. Cottrell, Jr., and Thomas P. McElroy, Jr., curator of the sanctuary. Mrs. Henry Whitney is president of the sanctuary association, which has 507 members.

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### Quetico Committee Extended

By Executive Order the President of the United States has extended the life of the President's Quetico-Superior Committee to June 30, 1950. This enables the Committee to carry on its important work of advising and aiding in the completion of the consolidation of the Quetico-Superior wilderness area.

## Recent Bulletins

"Butterflies of Grand Canyon National Park," by John S. Garth, is Bulletin No. 11 of the Grand Canyon Natural History Association, Grand Canyon, Arizona. It is an illustrated, 52-page bulletin with endmap and available for 75 cents from the Association. . ."The Atomic-Molecular Theory," by Leonard K. Nash, is a study of some of the pivotal stages in the development of the modern atomic and molecular theory. It is published by the Harvard University Press, Cambridge, Massachusetts, at $1.35. . ."Fine Books" is the title of a catalog of fine books on the Southwest and West, on mountaineering, natural history, biography and poetry, and is available on request from William H. Carr, 1708 N. Santa Rita Ave., Tucson, Arizona. . ."More About Animal Behavior," by Ernest P. Walker, is Publication 4006 of the Smithsonian Institution, Washington, D.C. and a republication from the Smithsonian Report of 1949. . . "The Breeding Habits of the Weaverbirds," by Herbert Friedmann, is a study on the biology of behavior patterns, and is Publication 4007 of the Smithsonian Institution, Washington, D.C. . . ."New Zealand, A Botanist's Paradise," by Egbert H. Walker, is Publication 4008 of the Smithsonian Institution, Washington, D.C. . . ."Erosion, Then and Now" is a discussion of the erosion problem in its relation to grazing and is published by the American National Live Stock Association, 515 Cooper Building, Denver, Colorado . . ."The Explorer," Volume 2, Number 4, publication of the Cleveland Museum of Natural History, Cleveland, Ohio, is devoted to birds and available at twenty-five cents a copy. . ."Clean Water Is Everybody's Business" is Public Health Service Publication No. 11, and a concise presentation of the pollution problem. It is available from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. at twenty cents. . ."The Division of Conservation" describes the history of conservation at Michigan State College, East Lansing, Michigan, and presents, textually and pictorially, the conservation education program provided at that College. . . "Going, Going, Gone" is a discussion of endangered species by the Fauna Preservation Society, The Zoological Society of London, Regent's Park, N.W.8, London, England.

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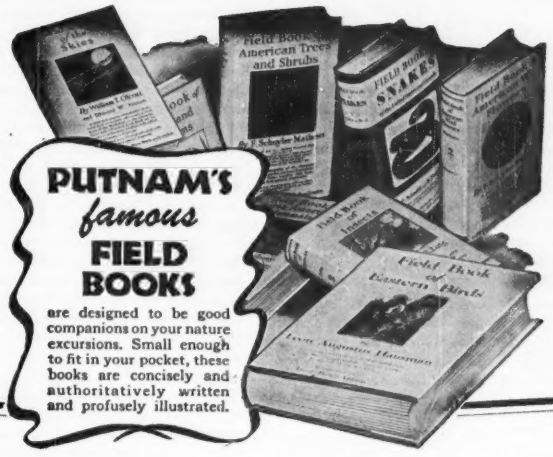
## Fungi

*Morphology and Taxonomy of Fungi.* By Ernst Athearn Bessey. Philadelphia. 1950. The Blakiston Company. 791 pages. Illustrated. $7.00.

This is a textbook presenting an orderly and complete treatment of the structures, life histories and classifications of all the important groups of fungi. It provides the basic information that will serve as the foundation for more intensive study of specialized groups. Dr. Bessey is one of the country's distinguished mycologists.

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## DINOSAUR NATIONAL MONUMENT

(Continued from page 36)

seldom said anything. It was up to us to see what was to be seen. We were almost at the mouth of the small, entering canyon and below us, in the center of the vista, was a great monolith — Steamboat Rock. Its wall overlooked the junction of the two rivers and was responsible for one of the major twists of the Green, down river from their confluence.

As we entered the main canyon, we felt again the welcome moisture from the river. The outer bend was encompassed by a stupendous wall of rock a thousand feet high. Between it and the river was a level, park-like plain with grass and scattered trees. Across the river in the river bend was this long and massive natural wall — to which the river clung on three sides — Steamboat Rock. The great rounded bend was Echo Park, or Pat's Hole. We could see the junction of the two rivers, each emerging from its own private, fantastic canyon. The rivers were placid here; it was the stone, twisted like taffy, which seemed violent and tumultuous. Only the great perpendicular wall of the bend itself, dwarfing us like pygmies on the river plain, seemed in repose and above violence. For the first time in my life I was at the bottom of one of the major western canyons. I climbed the slope between river and wall. Below me was the pleasant, park-like plain, alive with lazuli buntings; at my back that unbelievable palisade; broadside across from me, Steamboat Rock. The scene was so tremendous, I did not regret that I knew but little of the geology of the place. I was glad to absorb the awesome, humbling spectacle without the leavening of sophistication and knowledge.

The proposed dam would be a couple of miles or so down river on the other side of Steamboat Rock, and the water would fill that enormous cirque and mount half way up those vertical cliffs. What a taming of that vast, extravagant scene!

We stopped again at the end of the Rock, and Dick and I followed a trail along a ledge at the foot of the cliffs which fell from Harpers Corner. We were almost at the dam site. We looked longingly across at Steamboat Rock and figured ways of climbing it. Climber that he is, Dick expressed his wholesome respect for those who had traversed the crest and had raised the cairn at its head. We tried out the echoes of this great basin. Our shouts carried easily to the others who were barely visible to us.

The sky was overcast as we drove out of the canyon. Again there was that distant aspect — a bewitching green-blue where the sun lit up the valleys under the clouds. That night there was a mild shower.

The next morning we pushed out along an ever-diminishing trace through the sagebrush along one of the fingers of Blue Mountain toward Harpers Corner. Once we saw deer. Another time we loosened the staples holding up barbed-wire fencing and, standing on the strands, permitted the vehicles to pass. After miles of that dwindling trace, the way became impossible and we walked on through pines and sagebrush. The soil was gravelly and became more rocky as we proceeded. To our right, warmly blue through the trees, was the vast gulf around Steamboat Rock where we had been the afternoon before. We paused for a moment to watch the wheeling and dipping of white-throated swifts. Overhead the sun shone through magnificent cloud masses. The ridge became more narrow, the trees sparser and the ground became solid rock, dropping away in crags on either side.

The point itself was crumbling at the edges into chunks of rock, which were loosely piled upon each other. A disintegrating neck of these loose boulders had almost severed the actual point from the main body of the ridge and it made me dizzy to cross this place, although others, including Anne, traversed it easily.

The sun blazed down on the treeless tip and the incredible view met our eyes in unrelieved, pitiless nakedness. To the west there was comparative order in the deep, sinuous gash of the Green River valley stretching away from us. But to the north and east the valleys of the Green and Yampa were twisted and tortured beyond belief. Great, solid layers of mesa broke into plunging canyons. And the intervening mountains were so drawn and contorted that I was again impressed with their likeness to ropes and hunks of brown and yellow taffy. It was a vulcan's pit of creation — raw and baking with heat — shouting out its story of colossal upheaval, and of rending, tearing, everlasting attrition.

Little was said. These scenes spoke louder than our own futile thoughts. And each of us was oppressed, I think, that any men could wish to submerge — or alter one whit — these incomparable canyons.

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## THE HEAVENS IN 1951

(Continued from page 44)

and will not set until more than four hours after the sun. The planet will draw in rapidly toward the sun after that date. It will be at its greatest brilliancy in the evening sky on July 29, and in inferior conjunction with the sun on September 3. It then passes to the morning sky and attains its greatest brilliancy as a morning star on October 10. On November 14 Venus will be at its greatest western elongation, when it will be farthest west of the sun and will rise more than four hours before it. Both Mercury and Venus show in the telescope the same phases as the moon. At times of superior conjunction, although invisible to us, they have the phase of full moon. The phase of eastern and western elongation is that of the half moon and at inferior conjunction; when the planet is between earth and sun and again invisible, the phase is the same as that of the new moon.

Mars will not be favorably placed for observation in 1951. It will be found in January low in the southwest after sunset and is fading in brightness as it continues to recede from the earth. At the beginning of the year it is fainter than a star of first magnitude. On May 22 Mars will be in conjunction with the sun and will then pass to the morning sky. It will not be in opposition to the sun in 1951.

Jupiter starts the year 1951 in the southwestern evening sky, and will remain in the evening sky until March 11, when it passes to the morning sky at time of conjunction with the sun. Next to Venus, Jupiter is the most brilliant of the planets and will be a splendid object in the western evening sky during the winter months. During the spring and summer Jupiter will be a fine morning star, and on October 3, when in opposition to the sun, it will be visible all night. It will be visible in the evening sky from then on to the end of the year. During 1951, Jupiter will pass from the constellation of Aquarius into Pisces.

Saturn will remain in the constellation of Virgo throughout the year 1951. It will be found in the morning sky in January, rising shortly after midnight. On March 20 it will be in opposition to the sun and visible all night. It will remain in the evening sky from then on until it is in conjunction with the sun and passes again to the morning sky on September 29.

The three outermost planets — Uranus, Neptune, and Pluto — are of interest chiefly to telescopic observers. Uranus can be seen as a faint, starlike object without telescopic aid if one knows exactly where to look for it, although even the smallest telescopes will show that it has the characteristic planetary disk. Neptune also is visible in small telescopes. Pluto, which is probably smaller than the earth in size, is much fainter than the other two outer planets and can be seen only in larger telescopes.

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### Conservation Stamp

Stamp collectors, sportsmen and conservationists are urged by the National Wildlife Federation to join in urging the issuance of a series of postage stamps commemorating the conservation of the country's natural resources. Claude D. Kelley, president of the Federation, declares: "There is a deplorable lack of recognition given by the U.S. Post Office Department to the wildlife of the United States or to the natural resources upon which wildlife depends. The soil and waters of our nation, as well as its forests, minerals and wildlife, are its strength. Our natural resources have helped make this country the strongest nation on earth in the short space of 300 years, and yet very little recognition to such towering strength is depicted on our postage stamps."

### Reading Choices

For several years the biology students at Stroudsburg High School, Stroudsburg, Pennsylvania, have been required to read and report on one magazine article during each marking period. Lists of acceptable articles are posted and the selection left to the students. Thomas H. Knepp, head of the biology department, has been interested in the selection of articles and kept a careful record of student choices in an effort to answer certain questions that arose in his mind.

Mr. Knepp found, for example, articles dealing with medicine attracted 19 percent; mammals 17 percent; birds 13 percent; hygiene 11 percent; plants 11 percent, and other subjects of various smaller percentages. Amphibians, reptiles, food and conservation elicited the least interest. Mr. Knepp also reported that "28 percent of the readers selected articles in *Nature Magazine*; 22 percent chose articles from *Hygeia*; 19 percent read articles from *Natural History*. *Scientific American*, *Animal Kingdom*, *National Geographic*, *Travel*, *Canadian Nature* and *Life*, respectively, had a decreasing number of readers."

Mr. Knepp also tried to determine whether a catchy title attracted more readers than a matter-of-fact or prosaic title. His tabulations appeared to prove that the catchy title was more attractive. Report of this study was made in *Turtox News* for August, 1950.

### Tropical Wildlife Tours

Tropical Florida Wildlife Tours of one and two-day duration to outstanding areas under the jurisdiction of the National Audubon Society in Florida are available to all visitors to the Southland through April. Full information about the tours are available from National Audubon Society, 13 McAllister Arcade, Miami, Florida.

### Tree Pest Leaflets

Two new bulletins in the series of Tree Pest Leaflets issued by the New England Section, Society of American Foresters, are now available from Henry I. Baldwin, Hillsboro, New Hampshire. One deals with the Allegheny mound-building ant and the carpenter ants, and the other with beech scale-nectria. Full information with respect to these bulletins and the considerable list of previous bulletins may be obtained from Mr. Baldwin.

### Ivory-bill Refuge

The ivory-billed woodpecker, America's rarest bird, has been given a 1300-acre sanctuary through agreements reached between the landowners, the Florida Game and Fresh Water Fish Commission and the National Audubon Society. The St. Joe Paper Company, the Neal Lumber and Manufacturing Company and M. L. Kelso have cooperated to establish as a refuge on this area on which a pair of the birds was sighted last winter.

### Wildlife and Fish

Now that the Dingell Bill has become law, and a program similar to that provided under the Pittman-Robertson Act will be applied to fish life, the U. S. Fish and Wildlife Service has wisely decided to combine the two activities. The Federal Aid Branch of the Service will handle both cooperative programs, which, after all, are closely interrelated. Fishery specialists qualified to appraise various projects submitted by the States will be added to the staff. Funds to carry out the provisions of what is now known as the Dingell-Johnson Federal Aid to Fisheries Act will not become available until appropriations are made by Congress for the fiscal year beginning July 1, 1951.

### Walcott Memorial

As a living memorial to the late Frederic C. Walcott, former president of the American Wildlife Foundation, the foundation has created a "Frederic C. Walcott Memorial Fund." This fund, which will be built from contributions, will accumulate until income will be adequate to finance illustrations, preferably color plates, for outstanding books on wildlife management that otherwise might be published without suitable illustration. Former Senator Walcott was an accomplished painter and keenly interested in art, as well as in conservation.

### Missouri Conservation

Missouri stands in the front rank of States with effective, non-political conservation departments and with a progressive conservation program. Conservationists everywhere will find both information and inspiration in the 1949-50 report of the Missouri Conservation Commission's report on its stewardship of the State's natural resources. This report from I. T. Bode, Director, and his staff takes up the entire September issue of *The Missouri Conservationist*, and covers both wildlife and forestry.

### Park Visitors

Each year seems to add a new record in the total of visitors to the national parks, monuments and other areas under the administration of the National Park Service. The travel year ending September 30, 1950, show a total of 32,782,238 visitors, an increase of nearly a million above last year's figure. The Lincoln Memorial had the most visitors, with Great Smoky Mountains, in Tennessee and North Carolina, leading the national parks.

### Alabama Parks

Attendance at the State Parks of Alabama during the 1949-50 fiscal year set a new record when 1,010,467 visitors were reported for the eleven parks in the State. Gulf State Park on the shores of the Gulf of Mexico in lower Baldwin County proved to be the most popular recreational area, with Monte Sano State Park, near Huntsville, in Madison County, in second place.


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# UNDER THE MICROSCOPE

*By* JULIAN D. CORRINGTON

## SCIENCE SHOPS

### 1. Introduction

THE stores where scientists go shopping for their apparatus and materials have come to be called *Supply Houses* in America. The service of supply for scientists is a big business, international in scope, almost completely mail order, and almost completely unknown to the layman. Some of the firms are factories rather than supply houses, ranging from such huge and famous concerns as Eastman Kodak or Bausch & Lomb to some small, one-man outfit that makes a single item. Other companies are primarily collectors of geological or biological specimens, rearing cultures of amoeba, scouring the waters of the Atlantic seaboard at the proper season for runs of schools of dogfish, trimming rock and fossil specimens shipped in from Colorado, or gathering and processing lily buds of suitable age for sectioning. Some houses are strictly pharmaceutical, others chemical, others apparatus and glassware; there are manufacturers, wholesalers, jobbers, and retailers. There are skeletons to prepare and mount, cats to embalm and inject, relief maps to cast and paint, miniature models of dinosaurs to mold, microscopes to assemble and inspect, microscope slides to fix, section, stain, and mount. There are hundreds of items in even a modest business, thousands handled by large concerns; millions if we take all together, with a combined catalog that would dwarf an encyclopaedia.

Many of today's largest institutions of supply grew from modest beginnings. The one-room, one-man establishment prospers; more space and more help are soon needed; incorporation follows, and so the ball starts rolling. Many others are fly-by-nights, unwise in the ways of either science or business, that soon fold and disappear. Certain biological supply houses started as adjuncts to universities or research centers, as that of the Stazione Zoologica Napoli in Italy, or the Supply Department of the Woods Hole, Mass., Marine Biological Laboratory. Researches at Eastman Kodak led, as a side issue, to the providing for our universities of rare organic chemical preparations.

Occasionally an instructor or professor becomes adept at certain operations in the manufacture of supply house items, as slide-making, culturing, skeleton-mounting; or he happens to live where certain leading commodities are found, as the occurrence of both the lake lamprey and necturus in the streams emptying into Lake Cayuga, at Ithaca, N. Y. in the springtime. He may decide to start a small business on the side and wake up one fine morning to find that the tail is wagging the dog. In a manner such as this arose the celebrated firm of microscope slide makers at Lincoln, Nebraska, of Powers & Powers, and the work of Dr. Powell at Elon College, N. C., transmigrated to what is now a major American firm, the Carolina Biological Supply Company.

The supply business is highly competetive. State and city laws, or private rules, often require that the purchasing department or officer of the customer institution secure three competitive bids on any order and award the contract to the lowest bidder. This system has at times allowed unscrupulous persons to set themselves up as a "supply house" in order to land a big city or state contract to furnish high schools with, say, beakers and testtubes, or lubber grasshoppers and crayfish. Such "companies" have no overhead, underbid legitimate firms, secure the award, furnish shoddy merchandise at a large profit then, when the teachers kick back to the purchasing office, and this office in turn seeks redress, the supplier has folded up and, like the Arabs, has silently stolen away, to do the same thing next season in another place or under another name. At one time, the big houses were not even interested in bidding on such contracts in spite of the huge volume of the business since, to win, they must pare estimates to the point where there was little or no profit, but they would still have to stand the gaff of complaints, losses from spoilage or breakage, delayed payments and other undesirable adjuncts. Today, very often, the teacher originating the order can specify the company that is to supply the goods, and the order will read "Blank Company's quality or better." This has helped, but the school under such regulations never will be completely free from the evils inherent in this system, which may save small sums of money but at the cost of inferior goods and disgruntled teachers, a poor saving in the long run, and forgetful of the objectives of good teaching.

Who are the customers of the Supply House? More people than you might think! Your doctor for one, and even more so your dentist. Veterinarians and hospitals are large customers, as are municipal and state health laboratories, engineering, sanitation, and related organizations. Drug stores, hospitals, bacteriologists, and physiologists buy from pharmaceutical houses. Research laboratories, as Bell Telephone, need expensive equipment, perhaps an electron microscope or a cyclotron. Sheriffs and Police Departments in larger centers maintain crime-detection laboratories and require such equipment as a bullet-comparison photomicrographic camera or an ultraviolet lamp to produce fluorescence. Museums, zoos, aquaria, herbaria, need many items. Amateurs and hobbyists, notably in the case of gemstones and minerals, are regular customers. But all of these lumped together are small change compared with the educational institutions.

Think of the immense number of high schools throughout the length and breadth of our land; think of the hundreds of small colleges, and also the great universities — smaller in number but greater in purchasing power. Add the Canadian institutions. Here is a business which is well worth going after! Every physics laboratory needs an elaborate outfit of machines, apparatus, equipment, some of which is continually wearing out and has to be replaced; every chemistry laboratory uses huge quantities of packaged chemicals and crated glassware, not to mention the smaller numbers of such expensive items as analytical balances. Geology departments need rock, mineral, and fossil specimens, as well as maps galore. Along with other departments they require cases, cabinets, laboratory tables, sinks, and stools; globes, charts, blackboards. Biology departments, or separate botany and zoology laboratories, have the greatest array of needs of all; maps, models, charts; furniture of every description; glassware and chemicals; microscopes and slides; dissecting and collecting equipment; skeletons, preserved specimens by the thousands, living materials from protozoa to hamsters, incubators, G.I. cans, tree trimmers, autoclaves, plant presses, library and office equipment, sterilizers, vitamin pills — the list is interminable. If a museum is run in conjunction, the requirements are manifolded. Biology departments explain premature gray hair in purchasing office personnel.

The publication and mailing of catalogs is a big business in itself. Sometimes these are handsomely bound books of hundreds of pages, with profuse illustrations on the best quality of heavily calendered paper. These are sent free to departments, often to individual teachers and, of course, to purchasing officers. Generally they are placed inadvertently on a shelf with others, with little thought that each such volume, if the recipient had to pay for it, would cost him as much as a year's supply of best sellers from some book-of-the-month club. It is difficult for the enthusiastic private collector or hobbyist to realize why restrictions must be placed on distribution of these expensive catalogs. He does not know it, and most other people do not know it either, but there is a species loose in this country that we may designate as *Homo sap*; it comprises both grownup juveniles and bona fide kids, who go in for collecting catalogs. They write engaging promissory letters requesting catalogs, and it becomes exceedingly difficult sometimes for the business manager of a supply house to decide on his proper course of action. Is the writer of the letter a kid collector who has not the slightest intention of ever ordering a dime's worth of merchandise, or is he some wealthy hobbyist who will become greatly incensed if not given every courtesy?

It is unfortunate but true that operational overhead in any large firm today

makes it impossible for them to do business with average individuals. There probably are hundreds of persons in this country who would buy small items, a few at a time, continuously over a period of years — even enough to pay for the cost of their catalog — but the mere routine of processing an order and carrying through the paper work on it until shipped and entered as paid, costs a minimum of $1.00, and so there is not a chance to handle the potential thousands of orders for ten-cent and two-bit items. This is another point the hobbyist does not understand when he finds himself unable to get much cooperation from the big fellows.

In addition to the principal catalogs, there must be monthly or seasonal mailings of broadsides — anything from clips out of the catalog to revised pricelists or bargains-of-the-month or new items — sent mainly to keep the company's name before their buying public. All the multitude of scientific journals expect the supply house to advertise with them — another item that runs up the cost of that box of twenty-five slides of cross sections of earthworm or that case of Bunsen burners. And finally, competitive business has bred a publicity feature that puts more red ink in the supply house ledger than any other, but at the same time is the most satisfying of all to the consumer — the *house organ*. These are periodical magazines, quarterly or monthly, mailed gratis to all teachers and institutions who are customers or who request them. Like the catalogs, they are not available for the individual who is not connected with an institution, and for the same reasons. Generally they are well illustrated; some run mainly to scientific articles and notes, with a sprinkling of advertising, mostly of new or seasonal items; some include chitchat about the establishment and its people; some are frankly and completely advertising, and these usually wind up in the wastebasket rather than in a file. Very large organizations, as Bausch & Lomb, publish one house organ for its customers and another that the outsider never sees at all, for its own organization. The publications of our great pharmaceutical houses are the most elaborate and beautiful of all journals now being produced; those of the scientific society cannot afford to come within the proverbial million miles of these in the matter of illustrating technical articles; the cost of color reproduction is now so great as to be prohibitive for all save the large and wealthy corporation. You can see a copy of one of these in your doctor's office, at your pharmacy, or on your next visit to a hospital, and you will not find it in the wastebasket, we are certain.

After this general introduction to supply houses and their problems we shall, in succeeding issues, introduce you to individual firms.

*Editor's note*: the author of the Department was for a number of years an officer in one of America's largest supply houses and writer and editor of their several house organs. At other times he has been a customer, shopping around the country for many items. He is thus able to bring both points of view to the writing of this new series.

## APPLE POLISHER

### Demonstrate Brownian Movement

IN ORDER to make digestion understandable in the biology, zoology, botany, or physiology course, it is essential that osmosis be demonstrated; but a real comprehension of this basic phenomenon depends in turn on molecular activity as seen in Brownian movement. The advanced laboratory, with expensive instruments available, can set up an ultramicroscope or darkfield outfit to show this performance. There is also obtainable at low cost a small smoke chamber, to be placed on the stage of a regulation microscope for exhibition of this movement; it was figured and described in our article on *Diffusion and Osmosis* in this Department for June-July, 1944. However, as is probably not known by all teachers, no extra equipment at all is required in order to put on a convincing display.

In our own courses we begin discussion of this phase of metabolism by using three lecture-demonstration experiments, equally serviceable in classroom or laboratory. First, a bottle of strong perfume or any liquid having a pungent odor is placed on the lecture table, in plain view of all, and uncorked. Students in various rows are asked to raise their hands whenever they are certain they can detect the odor. Within a few minutes, those on the front row will begin indicating reception of the smell, then further rows in turn, and, by the end of the period, the back seat frequenters should be registering.

The second demonstration consists in placing a large crystal of copper sulphate or potassium permanganate in a tall graduate of water. Some diffusion will be in evidence during the hour, then the cylinder is carefully removed to the laboratory (or a new one started there) so that day by day progress of the spread of the color in the fluid may be observed. It is stressed that there must be no stirring or disturbance of the graduate. Third, giving immediate results, a puff of cigarette smoke is exhaled over the heads of the audience and comments made as to the disappearance of the smoke and distribution throughout the room of the carbon particles.

The class is now ready to see for themselves some evidence of the molecules they have been told are doing the pushing around of the larger, visible (or redolent) particles. In the laboratory each student prepares a clean blank slide and cover glass, mounts the slide on the level stage of the microscope, puts on it two drops of distilled water, adds a tiny amount of some finely divided solid material, and then the cover glass. The grains are focused under low power, then high dry, with

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the diaphragm partly closed to reduce glare. A number of substances may be used, such as alumina or lamp black, but nothing is better or easier to secure than powdered carmine. It may be prepared from a speck of rouge or lipstick, if not stocked among the dry stains. Add a very small quantity to the water, or place on the slide two drops of a very dilute aqueous "solution" (really a mechanical mixture) of the dye.

Pay no attention to the larger clumps and masses, but seek out the smallest visible particles and watch them. They will be seen in continual motion, dancing up and down and to and fro in a completely fortuitous manner. They are being struck by the invisible water molecules and knocked hither and yon, an indirect but compelling proof of molecular activity. The rate of bombardment is speeded up by warming the preparation.

This demonstration of the kinetic principle of heat, known everywhere as *Brownian movement* or *pedesis*, was first performed about 1827 by the eminent Scotch botanist, Robert Brown (1773-1858), famous among biologists as the discoverer that the nucleus is a regular and important part of every cell (1833), and noted in botanical circles for his tracing of the pollen tube down to the embryo sac in plant reproduction studies (1831) and for work in plant geography.

## FAMILY ALBUM
### IV. Juice Refractometer

THE young gentleman in the accompanying picture is wearing the latest thing in Bausch & Lomb pendants, and he is displaying a remarkable degree of simultaneous ambidexterity and ambiopia, since he is using his right hand with his left eye. However, we realize that was done in order to display the instrument rather than the operator's nose, and that the picture was no doubt posed in a studio instead of being snapped in a warehouse at Goulds, Florida, or in a sugarbeet field in Brighton, Colorado.

The devise so manifestly displayed here is the latest issue in pocket-sized refractometers and, since the obvious reply to this instructive remark runs thiswise: "What in Sam Hill is a refractometer?" we shall ascend from particulars to generalities.

Be it known, then, to all and sundry who seek information concerning this physical universe in which we abide, that light travels at the unfathomable speed of 186,000 miles per second through the nothingness of interstellar space, but that in any ponderable matter, this velocity is slowed; the denser the matter, the slower the speed. Thus, light travels slower through air than through a vacuum, slower in water than in air, and slower still through glass. If entering the denser medium at any oblique angle (anything except an exact perpendicular) the light rays are bent toward this perpendicular, whereas upon emerging from the denser into the less dense medium again, the rays bend away from the perpendicular. The amount of such bending is an index of the density of the substance, and is made into a relative scale by making this amount, termed *refractive index*, equal to unity for a vacuum. Since all substances are denser than a vacuum, all refractive indices are greater than 1, the R. I. (also abbreviated as $n$ or $mu$) for air being 1.0003; for water, 1.33; for a common form of crown glass, as in window panes, 1.52; for heavy flint glass, up to 1.9; while for diamond it is 2.42. The index for air is taken to be 1, close enough for all practical purposes, so when this is compared with water, as when a ray of sunlight traveling in air enters a body of water, of $n$ 1.33, the ratio is 1.33 to 1.00, or 4/3, meaning that water bends (refracts) light 1/3 more than does air, or that the velocity of light in air compared to its velocity in water is as 4 to 3.

Refraction is a universal phenomenon that occurs whenever light passes from a medium of one density to a medium of another density, so the inventive mind of man saw that here was an opportunity for measuring densities of liquids and of transparent solids. The refractometer is the instrument that performs this service, measuring the amount of bending of light on entering the sample, and it exists in a variety of styles and sizes, some laboratory models being relatively large, expensive, and of course far more precise than the small hand item to which we are awarding this month's nod as a third cousin thrice removed of the microscope.

The Juice Refractometer is used in the field, cannery, or laboratory, to determine on-the-spot total dissolved solids in samples of fruits, vegetables, juices, and beverages during the ripening stage and both before and after canning or bottling. Thus, wherever the local big business is grapes, citrus, tomatoes, berries, beets, cane sugar, or maple syrup, or the processing of these and others into drinks, juices, jams, jellies, preserves, and canned items, the most important feature to control is the sugar content, after which come fruit acids and salts. The refractometer scale reads total dissolved solids content directly to one-tenth of one percent, using transmitted light for clear or transparent solutions, reflected light for turbid samples, both refracted through prisms. There is a wide-aperture focusing eyepiece, and a precise, easy-to-read scale, with lines alternated, even tenths on one side and odd tenths on the other, an orange-colored background assisting reading.

Depending on locality, ripeness of the product, previous history, and other factors that will be known to particular operators, a definite relation between percent solids and percent sucrose (cane sugar) is readily estimated. Inasmuch as refractive index alters markedly with changes in the temperature of the specimen, a standard must be adopted, and that standard meeting with universal agreement is 20°C. Laboratory models are equipped with or supplemented by more or less elaborate constant-temperature control apparatus; in the hand refractometer, there is a thermometer on the side (seen in the photograph) graduated in percentage of total dissolved solids, for the addition or subtraction to be read directly whenever the temperature of the sample is other than 20°C. The chain is merely a guard to prevent damage by inadvertent dropping of this outfit of prisms and lenses which, if you owned one, you would about as soon drop as you would allow someone to make off with your left arm.

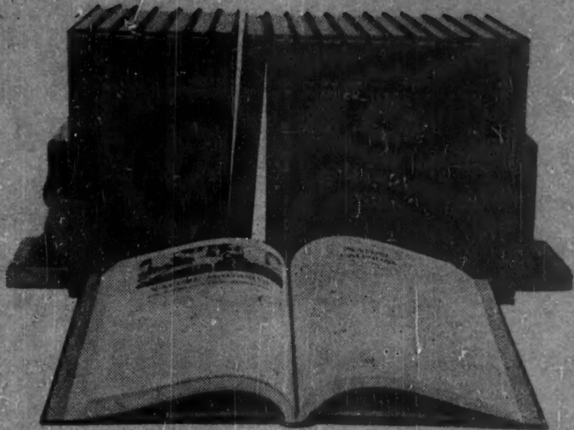
## SONGS FOR THE COMPARATIVE ANATOMY LABORATORY

***Fumes Get in Your Eyes***
***(The Formalin Song)***
**Air: *Smoke Gets in Your* Eyes.**

They asked me if I knew
How shark puppies grew?
I of course replied,
"There's something here inside
"That I have not descried."
They said, "Someday you'll find
"A yolk-sac on behind.
"You must scrutinize!"
But, as I dissect,
Fumes get in my eyes.
How I laughed,
And how I gaily chaffed,
To think they could doubt my zeal;
But today, my marks have gone
astray,
I need a whole new deal.
Now, laughing friends deride
F's I cannot hide.
So I smile and say,
"To hell with all you guys,
"Fumes get in my eyes."

## EYEGLASS MOVIE

The Better Vision Institute has produced a new 16mm color sound movie, 20 minutes in length, entitled "Wonderland of Vision." The Narrator is Westbrook Van Voorhis, noted commentator of the *March of Time* series. Bookings for the showing of this film by clubs, schools, colleges, and television stations may be obtained by writing the Bausch & Lomb Optical Co., Rochester 2, N. Y., or its branches in New York City, Chicago, or San Francisco, or the Better Vision Institute, 630 Fifth Ave., New York 20, N. Y. The many skills required and sciences involved in eyeglass manufacture are shown.



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